Do not smoke and make certain there are no open flames in the immediate area when fi
ing the fuel tank. Keep the container in contact with the tank being filled, or provide a grou
to prevent a spark from igniting the fuel vapors.

DURING OPERATION

Do not wear loosely hanging clothing or neck ties on the job. Wear goggles or safety glas
es, gloves, and hard hats during crushing operations.

Be sure all guards and covers are installed in their proper locations.

Do not operate the engine in an enclosed area unless the exhaust fumes are piped to t
outside. Inhalation of exhaust fumes may result in serious illness or death.

Stand clear of hauling equipment that is dumping material into the hopper.

Keep the equipment firmly blocked while operating.

Always keep hands clear of moving parts. Never attempt to wipe oil, refuel, or make a
justments while the plant is in operation.

Report or correct any conditions that may result in injury to personnel if operation is
be continued.

AFTER OPERATION

Make adjustments in a proper manner. Be sure all guards and covers are properly install
after adjustment or maintenance operation.

Do not perform welding operation until the welder ground is placed as near to the ar
of welding as possible to prevent possible arcing through bearings or other vital parts.

Do not use a lifting device with a capacity of less than 12,500 pounds when lifting a
major assemblies. Use an adequate lifting device when lifting heavy components. Do not all
suspended major assemblies or components to swing. Failure to observe this warning may
sult in serious injury or death to personnel.

Never leave a heavy assembly or component in an unstable position that could result
the assembly or component falling on personnel.

MANUFACTURING COMPANY MODEL 2A–2A) FSN 3820–851–6728, COMPONENT OF CRUSHING AND SCREENING PLANT, DIESEL ENGINE DRIVEN, FSN 3820–878–4285

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. These instructions are published for the use of direct and general support and depot maintenance personnel maintaining the "Iowa Manufacturing Model 2A–2A Portable Jaw Crusher." They provide information on the maintenance of the equipment, which is beyond the scope of the tools, equipment, personnel, or supplies normally available to using organizations.

b. Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to Commanding General, U. S. Army Mobility Equipment Comman ATTN: AMSME-MPP, 4300 Goodfello Boulevard, St. Louis, Mo. 63120.

c. Report all equipment improvements re ommendations as prescribed by TM 38–75

2. Record and Report Forms

a. DA Form 2258 (Depreservation Gui of Engineer Equipment).

b. For other record and report forms app cable to direct and general support and dep maintenance, refer to TM 38–750.

Note. Applicable forms, excluding Standard Fo 46 (United States Government Motor Vehicles O erator's Identification Card) which is carried by t operator, shall be kept in a canvas bag mounted on t equipment.

Section II. DESCRIPTION AND DATA

3. Description

A general description of the Portable Jaw Crusher, the location and description of the identification and instruction plates, and information on the differences in models are contained in the Operator and Organizational Maintenance Manual. The repair and maintenance instructions are described in appropriate sections of this manual.

4. Tabulated Data

a. General. This paragraph contains all the

crushed (based on material weight of 100 lbs. per cubic foot)

c. Engine.

Manufacturer	General Motors
Model	4031C
Series	71
No. of cylinders	4
Displacement	284 cubic inches
Bore	4.25 inches
Stroke	5 inches
Compression ratio	17:2
Firing order	1–3–4–2

	Belt length—62 feet
Length conveyor	23 feet
Bearings	
Head pulley	Flange type
Tail pulley	Pillow block type
Toughing roll assembly	Three roll type
Diameter	4 inches
Bearings	Sealed ball bearings
Retrun roll assembly	Single roll type
Diameter	4 inches
Bearings	Sealed ball bearing
Snub roll	Disc type
Diameter	6 and 8 inchee
Bearings	Flange type—both snub rolls
Head pulley	12 inch dia, solid, lagged
Tail pulley	10 inch dia, wing

e. Feeder.

Type	Reciprocating plate
Inside width (feeder plate).	21-3/4 inches
Clutch	Twin Diec Model CL208
Grizzly Length	18-1/4 inches

f. Crusher.

Type	Overhead eccentric jaw
Size	15 inchee x 24 inches
Drive	V-Belt
RPM	300
Bearings	Roller, self-alining
Pitman	One piece electric cast steel
Jaws	Manganese steel reversible
Key plates	Manganeee eteel reversible

g. Standard Engine Nut and Bolt To Data.

Size Nut or Bolt	Torque lb-ft	Size Nut or Bolt	Torque lb-ft	Size Nut or Bolt	Torque lb-ft
1/4-20	7-9	7/16-20	57-61	3/4-10	240-250
1/4-28	8-10	1/2-13	71-75	3/4-16	290-300
5/16-18	13-17	1/2-20	83-93	7/8-9	410-420
5/16-24	15-19	9/16-12	90-100	7/8-14	475-485
8/8-16	30-35	9/16-18	107-117	1-8	580-590
3/8-24	35-39	5/8-11	137-147	1-14	685-695
7/16-14	46-50	5/8-18	168-178		

h. Specific Engine Nut and Bolt Torque Data.

Cylinder Block		
Hand Hole Cover	3/8-16	10-15 ft-lb
Main Bearing Bolt (Boring)	5/8-11	165-175 ft-lb
Main Bearing Bolt (Assembly)	5/8-11	180-190 ft-lb
Main Bearing Nut (Boring)	5/8-18	140-155 ft-lb
Main Bearing Nut (Assembly)	5/8-18	155-185 ft-lb
Cylinder Head Stud		75 ft-lb
Main Bearing Stud		35-75 ft-lb
Cylinder Head		
Cam Follower Guide Bolt	1/4-20	12-15 ft-lb
Injector Control Shaft Bracket Bolt	1/4-20	10-12 ft-lb
Injector Clamp Bolt	3/8-16	20-25 ft-lb
Injector Clamp Nut	3/8-24	20-25 ft-lb
Exhaust Manifold Outlet Flange Nuts (Brass)	3/8-24	20-25 ft-lb

Flywheel and Flywheel Housing		
Flywheel Bolts	9/16–18	150–160 ft-lb
Oil Pan Bolts	5/16–18	10–12 ft-lb
Flywheel Housing Bolts	3/8–16	25–30 ft-lb
Idler Gear Hub and Spacer	3/8–16	40–45 ft-lb
Idler Gear Hub and Spacer	3/8–16	25–40 ft-lb
Flywheel Housing Bolts	3/8–24	25–30 ft-lb
Lifter Bracket Bolts	7/16–14	55–60 ft-lb
Flywheel Housing Bolts	1/2–13	90–100 ft-lb
Piston and Piston Rings		
Air Box Cover Bolt	3/8–16	10–15 ft-lb
Connecting Rod Nut (Lubrite)	7/16–20	60–70 ft-lb
Connecting Rod Nut (Castellated)	7/16–20	65–75 ft-lb
Camshaft and Balance Shaft		
Blower Drive Coupling to Gear Hub Bolt	5/16–24	20–25 ft-lb
Idler Gear Bearing Retainer Bolt	5/16–24	24–29 ft-lb
Flywheel Housing Bolts	3/8–16	25–30 ft-lb
Cam and Bslancer Shaft End Bearing Bolt	3/8–16	35–40 ft-lb
Flywheel Housing to Idler Gear Hub and Spacer (Self Locking Bolt only)	3/8–16	40–45 ft-lb
Flywheel Housing to Idler Gear Hub and Spacer (Wired Bolt only)	3/8–16	25–30 ft-lb
Balance Weight Cover Bolt	3/8–16 and 24	25–30 ft-lb
Camshaft Intermediate Bearing Lock Screw	3/8–24	15–20 ft-lb
Balance Weight to Hub Bolt	3/8–24	25–30 ft-lb
Blower Drive Gear Hub Bearing Support Bolts & Nuts	3/8–24	25–30 ft-lb
Balance Weight to Timing Gear Bolt	3/8–24	25–30 ft-lb
Generator Drive Bearing Retaining Bolt	7/16–14	30–35 ft-lb
Generator Drive Oil Seal Retaining Bolt	7/16–14	30–35 ft-lb
Tachometer Drive Cover Bolt	7/16–14	30–35 ft-lb
Generator Drive Bearing Retaining Bolt	1/2–13	30–35 ft-lb
Generator Drive Oil Seal Retaining Bolt	1/2–13	30–35 ft-lb
Tachometer Drive Cover Bolt	1/2–13	30–35 ft-lb
Rocker Shaft Bolt	1/2–13	90–100 ft-lb
Idler Gear and Dummy Hub Bolt	1/2–13	80–90 ft-lb
Blower Rotor Gear Retaining Nut	1/2–20	55–65 ft-lb
Crankshaft End Bolt	1–14	290–310 ft-lb
Camshaft snd Balancer Shaft Nut	1 1/8–18	300–325 ft-lb
Blower Drive Gear Hub Nut	1 1/2–16	50–60 ft-lb
Fuel System		
Injector Clamp Stud	3/8–16	10–25 ft-lb
Injector Clamp Bolt	3/8–16	20–25 ft-lb
Injector Clamp Nut	3/8–24	20–25 ft-lb
Fuel Pipe Nut	3/8–24	12–15 ft-lb
Rocket Arm Bracket Bolt	1/2–13	90–100 ft-lb
Injector Filter Cap	5/8–24	65–70 ft-lb

Blower Drive Hub-to-Blower Rotor Gear Bolt	5/16–24	25–30 ft-lb
Air Inlet Housing-to-Blower Housing Bolt	3/8–16	16–20 ft-lb
Blower Housing-to-Cylinder Block Bolt	7/16–14	55–60 ft-lb
Blower Rotor Timing Gear Bolt	7/16–20	55–60 ft-lb
Blower Rotor Timing Gear Bolt	1/2–20	55–65 ft-lb
Lubrication System		
Oil Pan Bolts	5/16–18	10–12 ft-lb
Oil Pump-to-Bearing Cap Bolt	3/8–24	25–30 ft-lb
Oil Pump Drive Idler Gear Nut (Marsden)	1/2–20	60–70 ft-lb
Oil Pan Drain Plug	18 m.m.	35–40 ft-lb
Power Take-Off		
Clutch Drive Shaft Nut	1 3/4–10	225–230 ft-lb
Clutch Driving Ring Bolt	1/2–13	71–75 ft-lb
Clutch Housing Bolt	7/16–14 x 1 1/4	46–50 ft-lb

i. Repair and Replacement Standards. Tables 1 and 2 lists manufacturer's sizes, tolerances, desired clearances, and m allowable wear and clearances.

Table 1. Engine Repair and Replacement Standards

Components	Manufacturer's Dimensions and Tolerances in Inches		Desired Clearance		
	Min.	Max.	Min.	Max.	
Cylinder Head					
Flatness (Transverse)	------	------	------	------	
Flatness (Longitudinally)	------	------	------	------	
Distance Between Top Deck and Fire Deck	3.5560	3.5680	------	------	3
Water Nozzles	0.03125 recessed	flush	------	------	
Cam Follower Boxes	------	------	1.0620	1.0630	1
Exhaust Valve Seat Inserts					
Seat Width (30°)	0.0625	0.00375	------	------	0
Valve Seat Runout	------	0.0020	------	------	0
Exhaust Valves					
Stem Diameter	0.3417	0.3425	------	------	0
Valve Head to Cylinder Head	0.0020 recessed	0.0280 protrusion	------	------	
Valve Guides					
Height Above Cylinder Head	1.59375	1.50375	------	------	1
Diameter (Inside)	0.3445	0.3445	------	------	0
Clearance—Stem to Guide	------	------	0.0020	0.0038	0
Rocker Arms and Shafts					
Rocker Shaft Bushing	0.8735	0.8740	------	------	
Rocker Arm Shaft Bushing Inside Diameter	0.8750	0.8760	------	------	

Components	Tolerances in Inches		Clearance		Wear and Clearance
	Min.	Max.	Min.	Max.	
Crankshaft					
Journal Diameter—Main Bearing	3.499	3.500	------	------	------
Journal Diameter—Connecting Rod	2.749	2.750	------	------	------
Journal Out-of-Round	------	0.00025	------	------	0.0010
Journal Taper	------	0.0005	------	------	0.0015
Runout on Journals					
No. 2 and No. 4 Journals	------	0.002	------	------	------
No. 3 Journal	------	0.004	------	------	------
Thrust Washer, Tsickness	0.1205	0.1220	------	------	------
End Thrust Clearance (End Play)	------	------	0.0040	0.0110	0.0180
Main Bearings					
Bearing Inside Diameter (Vertical Axis)	3.5014	3.5034	------	------	------
Clearance—Bearing to Journal	------	------	0.0014	0.0044	0.0060
Bearing Thickness—90° From Parting Line	0.1546	0.1553	------	------	0.1530 (min.)
Connecting Rod Bearings					
Inside Diameter (Vertical Axis)	2.7514	2.7534	------	------	------
Clearance—Bearing to Crankshaft Journal	------	------	0.0014	0.0044	0.0060
Bearing Thickness—90° from Parting Line	0.1548	0.1553	------	------	0.1530 (min.)
Cylinder Block					
Main Bearing Bore—Inside Diameter (Vertical Axis)	3.312	3.6130	------	------	------
Block Bore					
Diameter	4.6265	4.6275	------	------	------
Out-of-Round	------	0.0010	------	------	0.0030
Taper	------	0.0010	------	------	0.0020
Cylinder Liner Counterbore					
Diameter	5.0460	5.0485	------	------	------
Depth	0.4785	0.4795	------	------	------
Cylinder Liners					
Outside Diameter	4.6250	4.6260	------	------	------
Inside Diameter	4.2495	4.2511	------	------	------
Clearance—Liner to Block Bore	------	------	0.0005	0.0025	0.0080
Out-of-Round—Liner Inside Diameter	------	0.0020	------	------	0.0030
Taper—Liner Inside Diameter	------	0.0010	------	------	0.0020
Depth of Liner Flange BELOW High Block	0.0465	0.0500	------	------	0.0500
Height of Liner ABOVE Low Block	0.0020	0.0060	------	------	0.0060
Variation in Height Between Adjacent Liners	------	0.0020	------	------	0.0020
Pistons and Rings					
Piston:					
Height (Centerline of Bushing to Top of Piston)	3.5130	3.5160	------	------	------
Diameter:					
At Top	4.2190	4.2220	------	------	------
At Skirt (Below Compression Ring Grooves to Bottom)	4.2433	4.2455	------	------	------
Clearance—Piston Skirt to Line	------	------	0.0040	0.0078	0.0120

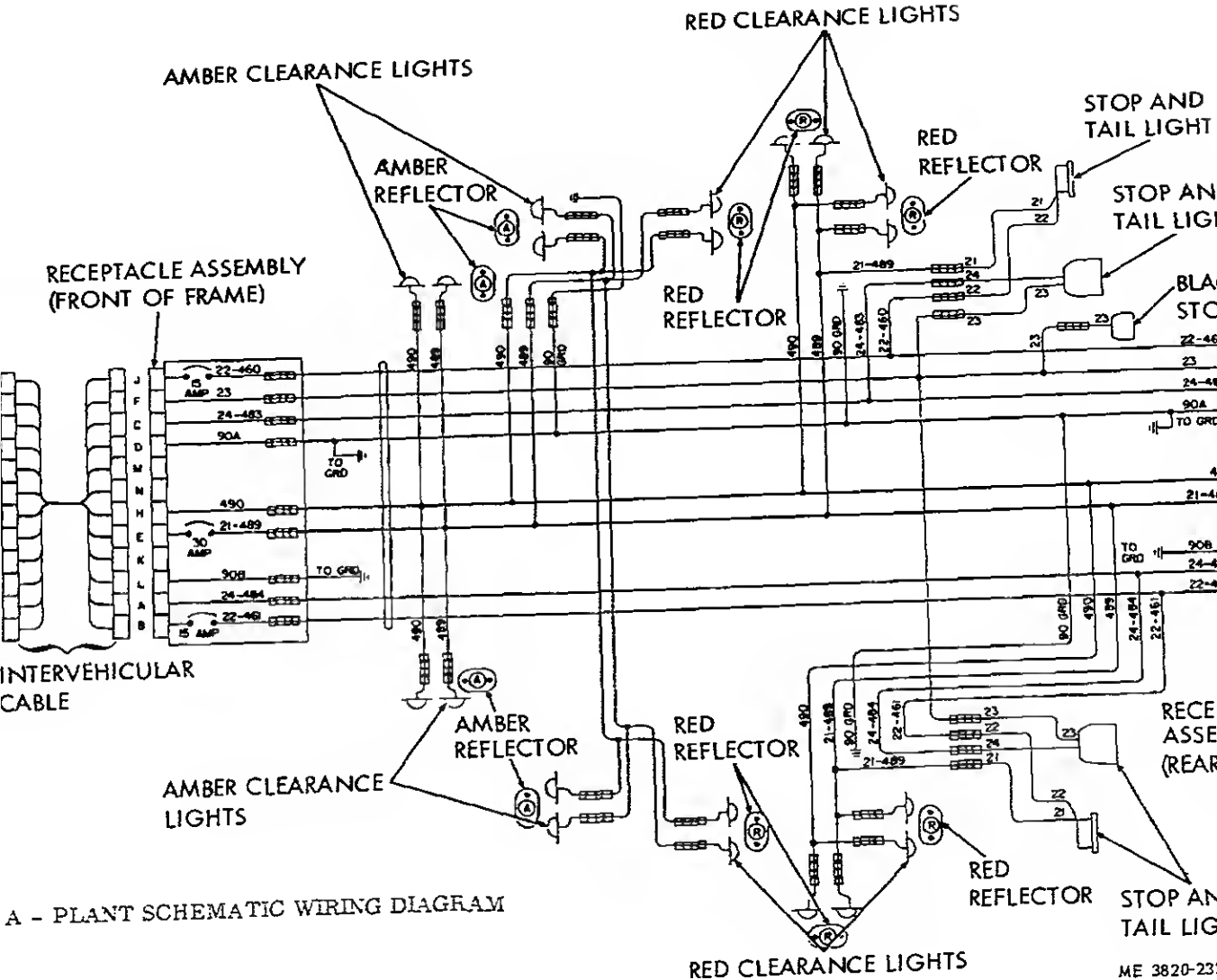
Piston Pins					
Diameter	1.4996	1.5000	------	------	1
Pin-to-Piston Bushing Clearance	------	------	0.0025	0.0034	0
Pin-to-Rod Bushing Clearance	------	------	0.0015	0.0024	0
Length	3.6050	3.6200	------	------	-
Pin-to-Retainer End Clearance	------	------	0.0160	0.0040	0
Piston Pin Bushings					
Inside Diameter	1.5025	1.5030	------	------	1
Connecting Rod					
Inside Diameter Upper Buahing	1.5015	1.5020	------	------	1
Normal Rod Side Clearance	------	------	0.0000	0.0120	-
Camshaft					
Shaft Diameter—At Bearings					
Front and Rear	1.4070	1.4975	------	------	-
Center and Intermediate	1.4980	1.4085	------	------	-
Shaft Diameter—At Gear	1.1875	1.1880	------	------	-
Length—Thrust Bearing End Journal	2.8740	2.8760	------	------	-
End Thrust	0.0040	0.0120	------	------	0
Thrust Washer Thickness	0.1200	0.1220	------	------	-
Balance Shaft					
Shaft Diameter at Bearing	1.4970	1.4975	------	------	-
Shaft Diameter at Gear	1.1875	1.1880	------	------	-
Length—Thrust Bearing	2.8740	2.8700	------	------	-
End Thrust	0.0040	0.0120	------	------	0
Thrust Washer Thickness	0.1200	0.1220	------	------	-
Camshaft and Balance Shaft Bearings					
Inside Diameter					
Front and Rear	1.5000	1.5010	------	------	-
Center and Intermediate	1.5010	1.5030	------	------	-
Clearance—Bearings-to-Shaft					
Front and Rear (Next to Flange)	------	------	0.0025	0.0040	0
Center and Intermediate	------	------	0.0025	0.0050	0
Outside Diameter of Bearings					
Front and Rear	2.1880	2.1885	------	------	-
Intermediate	2.1840	2.1860	------	------	-
Diameter of Block Bore	2.1875	2.1885	------	------	-
Clearance—Bearings-to-Block					
Front and Rear	------	------	0.001 Press	0.0005 Loose	-
Intermediate	------	------	0.0015	0.0045	-
Camshaft and Balance Shaft Gears					
Backlash	0.0080	0.0080	------	------	0
Gear Inside Diameter	1.1865	1.1875	------	------	-
Clearance—Gear-to-Shaft	------	------	0.0015 Press	0.0000	-
Idler Gear					
Backlash	0.0030	0.0080	------	------	0
Preload—Variation on pull 2 lbs.-11 oz.	1/2 lb.	6 3/4 lbs.	------	------	1

Components	Manufacturer's Dimensions and Tolerances in Inches		Desired Clearance		Maximum Allowable Wear and Clearance
	Min.	Max.	Min.	Max.	
Gear Inside Diameter	4.7490	4.7500	------	------	------
Clearance—Gear-to-Crankshaft	------	------	0.001 Press	0.001 Loose	------
Blower Drive Gear					
Backlash	0.0030	0.0080	------	------	0.010
Gear-to-Hub Fit	0.0005 Press	0.0010 Loose	------	------	------
Support-to-End Plate	0.0005 Press	0.0025 Loose	------	------	------
Support Bushing Inside Diameter	1.6260	1.6265	------	------	------
Hub Diameter—At Bushing	1.6240	1.6250	------	------	------
Hub-to-Support Bushing Clearance	------	------	0.0010	0.0025	0.0050
Hub-to-Cam Clearance	------	------	0.0020	0.0070	------
End Thrust	0.0050	0.0080	------	------	0.0100
Blower					
Backlash—Timing Gears	0.0005	0.0025	------	------	0.004
Oil Seal (Below End Plate Surface)	0.002	0.008	------	------	------
Pin-Dowel (Projection Beyond Inside Face of End Plates)	0.380	------	------	------	------
Clearances—					
Rotor to End Plate—Gear End	------	------	0.007	------	------
Rotor to End Plate—Front End	------	------	0.009	------	------
Rotor to Housing—Inlet Side	------	------	0.015	------	------
Rotor to Housing—Outlet Side	------	------	0.004	------	------
Trailing Edge of Upper Rotor to Leading Edge of Lower Rotor	------	------	0.002	0.006	0.006
Leading Edge of Upper Rotor to Trailing Edge of Lower Rotor	------	------	0.012	------	------

Table 2. Primary Jaw Crusher Plant Repair Replacement Standards

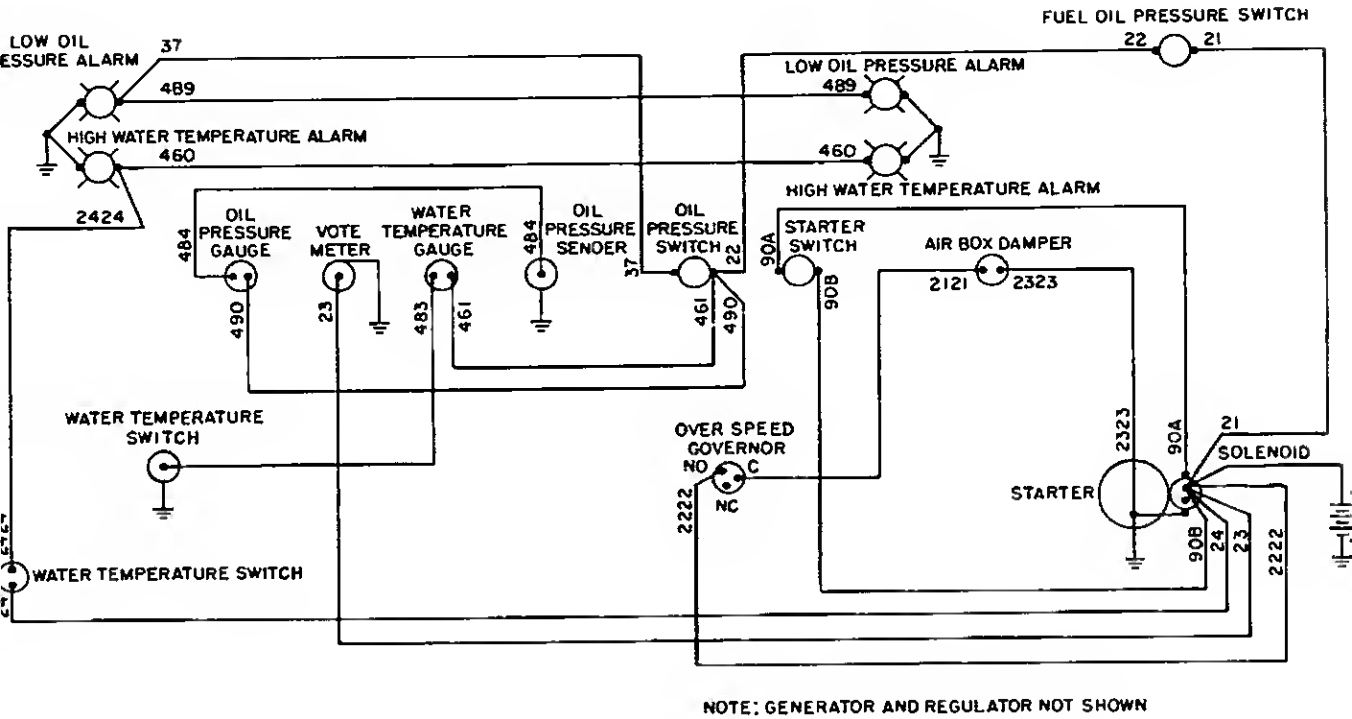
Components	Manufacturer's Dimensions and Tolerances in Inches		Desired Clearance		Maximum Allowable Wear and Clearance
	Min.	Max.	Min.	Max.	
Jaw Crusher					
Clearance—Pitman Bearing (Outer Race to Roller)	------	------	0.0025	0.006	------
Clearance—Pitman Bearing Seal	------	------	0.010	------	------
Mounted Clearance—Side Bearing (Outer Race to Roller)	------	------	0.003	0.005	------
Clearance—Side Bearing Seal	------	------	0.010	------	------

j. Schematic Wiring Diagram. Figure 1 shows the schematic wiring diagram for thi Portable Jaw Crusher Plant.



A - PLANT SCHEMATIC WIRING DIAGRAM

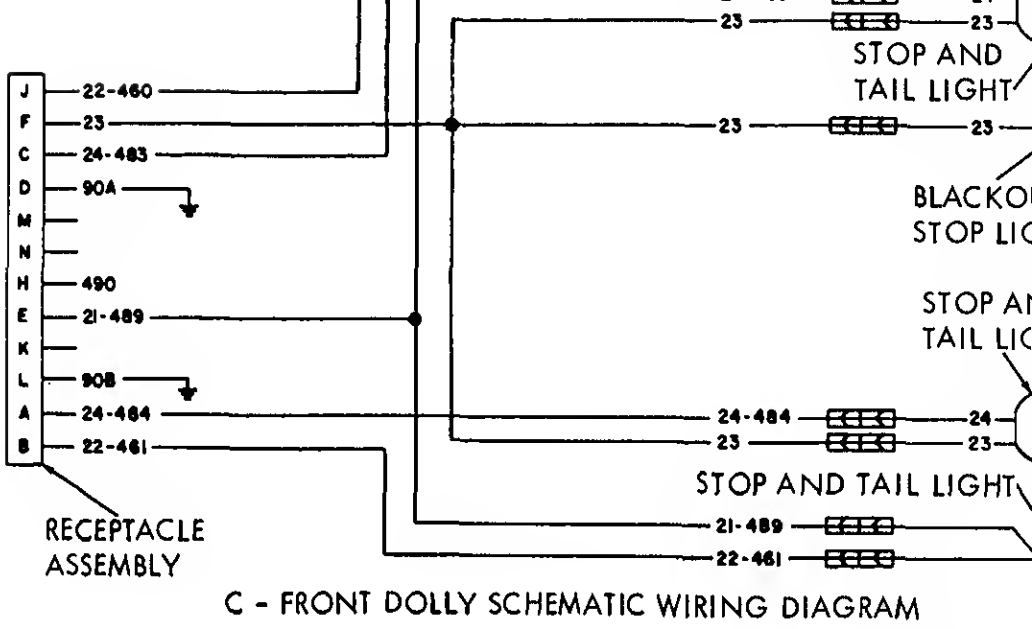
ME 3820-23



B – POWER UNIT SCHEMATIC WIRING DIAGRAM.

ME 3820-233-35-

Figure 1 (2). Continued.



C - FRONT DOLLY SCHEMATIC WIRING DIAGRAM

ME 3820-233-35-

Figure 1 (3). Continued.

CHAPTER 2

GENERAL MAINTENANCE INSTRUCTIONS

Section I. SPECIAL TOOLS AND EQUIPMENT

5. Special Tools and Equipment

The special tools required to perform direct and general support and depot maintenance on the Portable Jaw Crusher are listed in Table 3 and the applicable appendix of this manual. References and illustrations indicati the use of these tools are listed in the tab No special equipment is required by dire and general support and depot maintenan personnel for performing maintenance on t Portable Jaw Crusher.

Table 3. Special Tools

Item	Part No.		Ref. Fig.	Ref. Para	Use
Wrench	(31245)	45500–751–09	32–11	59	Side bearing removal and installation
Removal nut	(31245)	697BA	32–11	59	Side bearing removal
Tightening nut	(31245)	697–01	32–26	59	Side bearing installation
Wrench	(31245)	45500–752–20	32–10	59	Sleeve lock nut removal and installation
Wrench	(31245)	45500–752–23	32–9	59	Side bearing lock nut removal and installation

6. Direct and General Support and Depot Maintenance Repair Parts

Direct and General Support and Depot Maintenance Repair Parts are listed and illustrated in TM 5–3820–235–35P.

7. Specially Designed Tools and Equipment

No specially designed tools and equipme are required.

Section II. TROUBLESHOOTING

8. General

This section provides information useful in

9. Erratic Engine Operation

Probable Cause	Possible Remedy

(para 42)

10. Engine Locks Power

Probable Cause	Possible Remedy
Piston assemblies worn	Replace piston assemblies (para 45)
High engine temperature caused by defective water pump	Repair defective water pump (para 33)
Improper gear train timing	Time gear train (para 50)

11. Engine will not Turn

Probable Cause	Possible Remedy
Engine is locked or seized	Disassemble engine to determine the cause and replace necessary parts

12. Low Cranking Speed

Probable Cause	Possible Remedy
Starter brush springs weak	Check brush spring tension, replace springs if necessary (para 29)
Starter commutator dirty or worn	Polish commutator, machine commutator and under-cut mica if necessary (para 29)
Starter armature burned out	Replace armature (para 29)

13. Engine Hard to Start

Probable Cause	Possible Remedy
Exhaust valves ticking or burned	Check for bent valve guide and replace if necessary (para 42) Check for defective valve spring and replace if necessary (para 42) Clean and reface valve (para 42)
Compression rings worn or broken	Replace rings (para 45)
Cylinder head gasket leaking	Replace gasket (para 42)
Improper valve clearance	Check exhaust valve clearance and adjust
	tips (para 40)
	Replace injector plun and bushing assem (para 40)
	Time injector rack ar gear (Operator's Manual)
Worn fuel pump gears or pump housing	Replace gear and sha assembly in pump body (para 35)
Fuel pump not rotating	Check blower drive, if broken, replace necessary parts (para 36)
	Check fuel pump driv gear and shaft, if broken, replace necessary parts (para 35)
	Replace fuel pump (Operator's Manua

14. Low Oil Pressure

Probable Cause	Possible Remedy
Poor circulation	Remove and clean oil cooler core (Operat Manual)
	Replace oil cooler by-pass valve (Operator's Manua
	Replace oil pressure regulator valve (Operator's Manua
	Check if gallery, cran shaft or camshaft plugs are missing a replace if parts are missing.
Faulty oil pump	Replace oil pump (para 44)
Dirty oil pump inlet screen	Clean screen (para 4

15. Engine Overheats

Probable Cause	Possible Remedy
Improper engine lubrication	Check for proper operation of engine

17. Feeder Clutch Slips

Probable Cause	Possible Remedy
Worn driving plates friction surfaces	Adjust clutch (Operator's Manual) Replace driving plates

18. Side and Pitman Bearings Overheat

Probable Cause	Possible Remedy
Excessive or insufficient lubricant	Refer to the Operator's Manual
Plant out of level	Level plant (Operator's Manual)
Worn toggle plate	Replace toggle plate (para 60)
Flywheels loose	Tighten flywheel against the seal
Bearing failure	Replace bearings (para 59)
Insufficient radial clearance between side bearing end cap and seal	Place wedge between pitman and bearing housing and drive at base of side bearing housing until a 0.010 inch seal clearance is obtained. Tighten the housing to base capscrews (para 59)

19. Excessive Jaw Wear

Probable Cause	Possible Remedy
Stationary jaw loose	Tighten jaw (para 59)
Incorrect crusher discharge opening	Adjust crusher discharge opening (Operator's Manual)

Troughing roll assembly not positioned correctly in frame	Move one end of troughing roll assembly to change belt travel to center on troughing roll assembly. Refer to Operator's Manual
Spillage of material	Adjust flashing to eliminate spillage
Plant operating in unlevel position	Level complete plant
Troughing and return roller not rotating	Free rolls or replace defective rolls if necessary
Head or tail pulley moved	Center pulley and securely lock into position with the taper lock bushings

22. Conveyor Belt Slipping

Probable Cause	Possible Remedy
Insufficient conveyor belt tension	Tighten conveyor belt. Refer to Operator's Manual
Drive pulley lagging worn	Replace lagging. Refer to Operator's Manual
Troughing or return roll assemblies not rotating freely	Free roll assemblies or replace if necessar
Insufficient V-belt drive tension	Check drive and tighte V-belts if necessary

Section III. REMOVAL AND INSTALLATION OF MAJOR COMPONENTS

23. General

The power unit, feeder, delivery conveyor, and jaw crusher should be removed for high level maintenance and overhaul. The removal and installation of these components are discussed in this section.

The power unit and feeder, along with those

a. Crusher-to-feeder countershaft drive
b. Feeder countershaft drive guard.
c. Flywheels, rim sheave, and pulley.
d. Walkway railing above crusher.
e. Crusher hopper and walkway platf
f. Crusher flywheel guards.
g. Conveyor countershaft drive guard.

(1) Disconnect fuel lines from the power unit (Operator's Manual).

(2) Disconnect the battery cables.

(3) Refer to figure 2 and remove the power unit.

b. Installation

(1) Refer to figure 2 and install the power unit.

(2) Install the V-belts and adjust for proper belt tension (Operator's Manual).

Note. When making the belt tension adjustment be sure the power unit clutch drive shaft is parallel with the jaw crusher eccentric shaft.

(3) Connect battery cables.

Note. Connect negative (–) battery cable last.

(4) Connect fuel lines (Operator's Manual).

(5) Connect clutch control universal joint (fig. 2).

25. Reciprocating Feeder

a. Removal

(1) Remove countershaft drive rear guard (Operator's Manual).

(2) Remove feeder drive belts (Operator's Manual).

(3) Refer to figure 3 and remove the feeder and hopper complete with feeder drive.

b. Installation.

(1) Refer to figure 3 and install the feeder and hopper complete with feeder drive.

(2) Install feeder drive belts and adjust for proper belt tension (Operator's Manual).

(3) Install countershaft drive rear guard (Operator's Manual).

26. Jaw Crusher

a. Removal

(1) Remove feeder clutch control (Operator's Manual).

(6) Remove crusher hopper and v platform (Operator's Manual).

(7) Refer to figure 4 and remove crusher.

b. Installation

(1) Refer to figure 4 and install crusher.

(2) Install crusher hopper and v platform (Operator's Manual).

(3) Install crusher-to-power un crusher-to-feeder countershaft drive be just for proper belt tension (Operator ual).

(4) Install inner belt and inn wheel guards (Operator's Manual).

(5) Install the crusher guard fran erator's Manual).

(6) Install the front and rear c shaft drive guards (Operator's Manual

(7) Install feeder clutch control ator's Manual).

27. Delivery Conveyor

a. Removal

(1) Remove the front countersha hand guard frame (Operator's Manual

(2) Remove the front countershaf hand guard (Operator's Manual).

(3) Remove convoyor belt (Ope Manual).

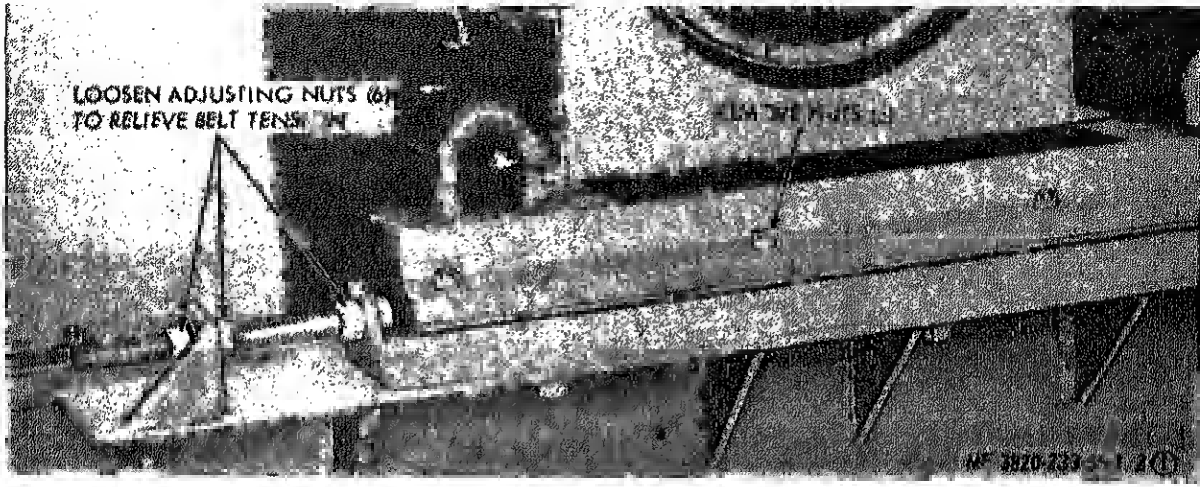
(4) Refer to figure 5 and remo speed reducer and conveyor head frame

(5) Disconnect conveyor tail fram the conveyor center support shown on 2.

(6) Refer to figure 6 and remo conveyor tail frame.

(7) Remove conveyor hopper fror crusher base as shown on figure 4.

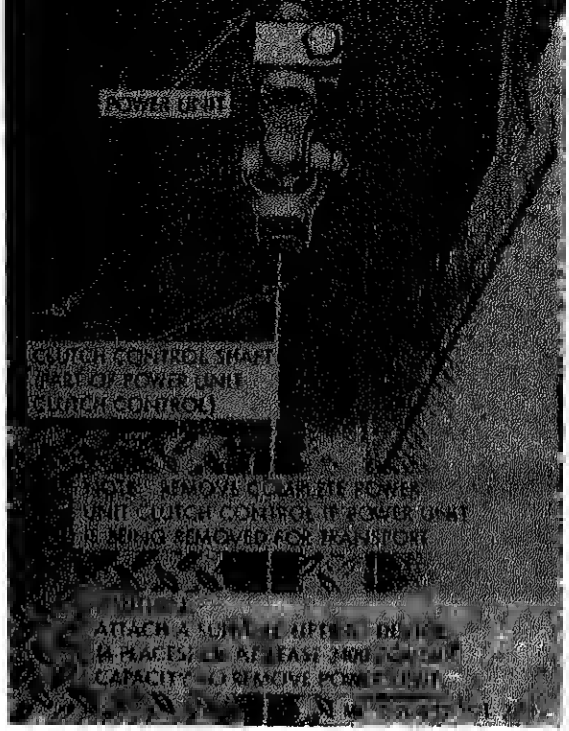
b. Installation



STEP 1. *DISCONNECT POWER UNIT FROM FRAME.*
Figure 2 (1). Power unit, removal and installation.

STEP 2. REMOVE GUARD AND DRIVE BELTS.

Figure 2 (2). Continued.



CAUTION. ATTACH A SUITABLE LIFTING DEVICE (4 PLACES) OF AT LEAST 3400 POUNDS CAPACITY TO REMOVE POWER UNIT.

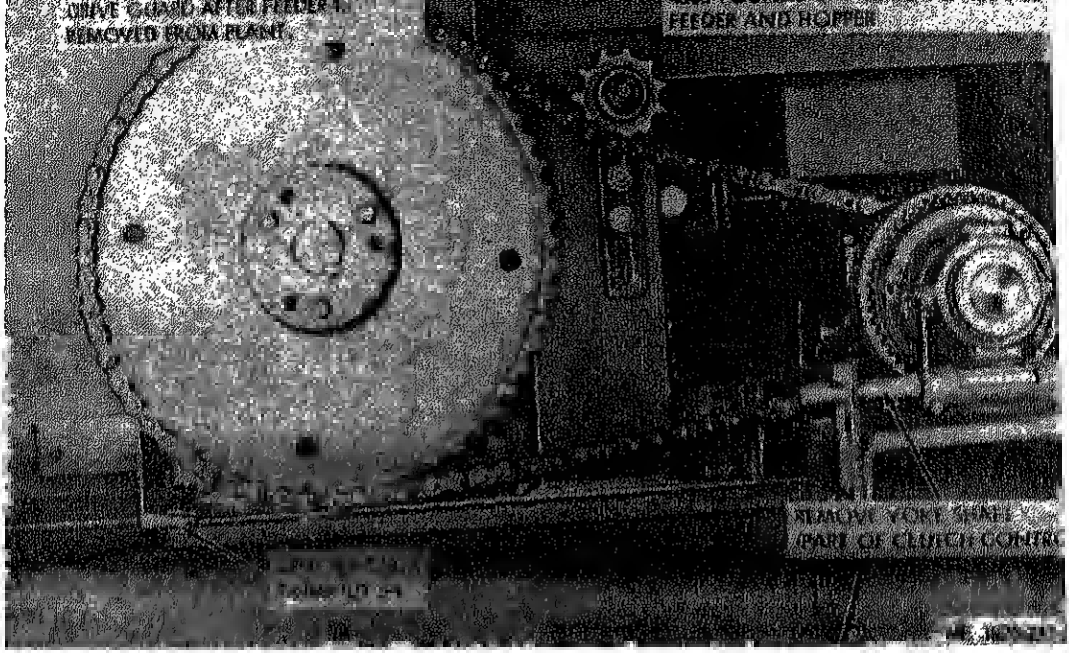
STEP 3. DISCONNECT CLUTCH CONTROL SHAFT.

STEP 4. REMOVE POWER UNIT

Figure 2 (3). Continued.

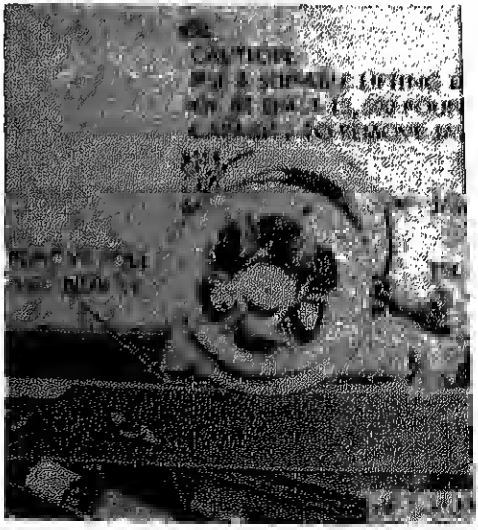
STEP 1. DISCONNECT FEEDER DRIVE GUARD AND WALKWAY PLATFORM FROM FEEDER AND HOPPER.

Figure 3 (1). Feeder and feeder hopper, removal and installation.



STEP 2. REMOVE FEEDER AND HOPPER COMPLETE WITH FEEDER DRIVE.

Figure 3 (2). Continued.



CAUTION: USE A SUITABLE LIFTING

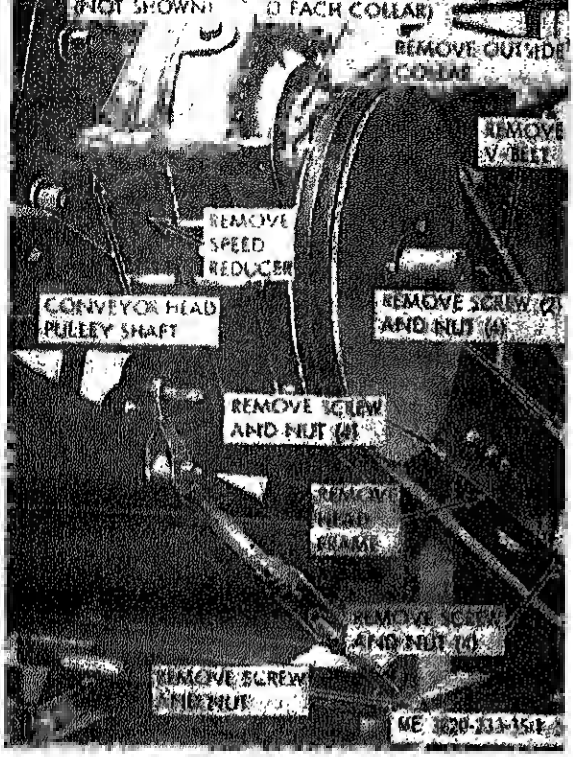
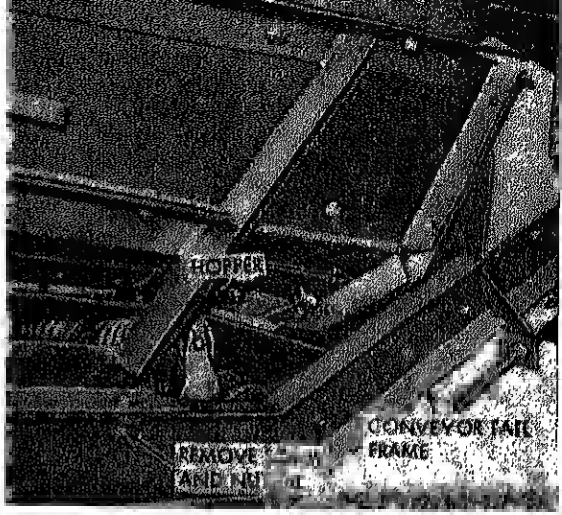
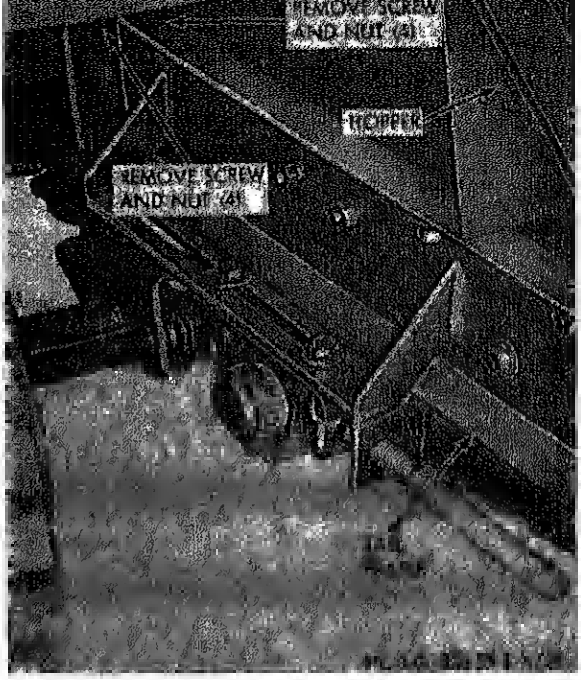


Figure 5. Speed reducer and conveyor head frame, removal and installation.



STEP 1. DISCONNECT HOPPER FROM CONVEYOR TAIL FRAME.

Figure 6 (1). Conveyor tail frame, removal and installation.



STEP 2. DISCONNECT CONVEYOR TAIL FRAME FROM HOPPER AND TRUCK FRAME.

STEP 3. REMOVE CONVEYOR TAIL FRAME.

Figure 6 (2). Continued.

CHAPTER 3

ENGINE REPAIR INSTRUCTIONS

Section I. ENGINE ACCESSORIES

28. General

This section contains those items which are considered accessories to the engine. They consist of the starter, battery-charging generator, radiator, water pump, hydraulic governor, fuel pump, blower drive, and overspeed governor.

29. Starter

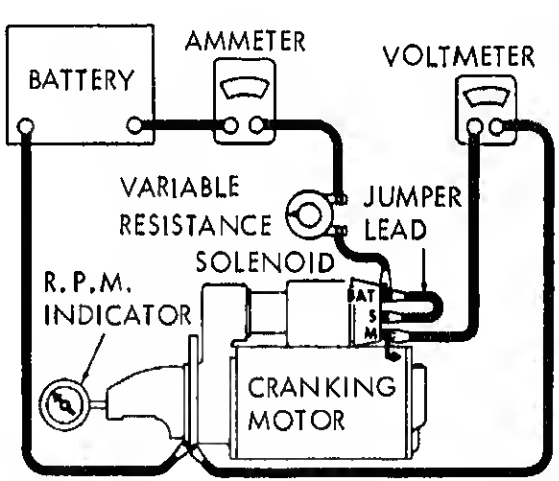
a. General. The starter is a 24 volt, 4-brush, gear drive type. The starter converts the electrical energy of the batteries into the mechanical energy necessary to crank the engine. The starter incorporates an overrunning clutch which shifts the starting motor pinion into mesh with the flywheel ring gear.

b. Removal. Refer to Operator's Manual.

c. Bench Testing

Note. Never operate the cranking motor more than 30 seconds at a time without pausing to allow it to cool at least two minutes.

(1) The armature should be checked for freedom of operation by turning the drive. Tight, dirty, or worn bearings, bent armature shaft, or loose pole shoe screw will cause the armature to drag and it will not turn freely.



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VOLTS	MIN. AMPS	MAX. AMPS	MIN. R.P.M.	MAX. R.P.M.
23.0	60*	90*	7000	10700

* INCLUDES SOLENOID

Figure 7-1. No load test.

(b) Rated current draw and no-load speed indicates normal condition of the cranking motor.

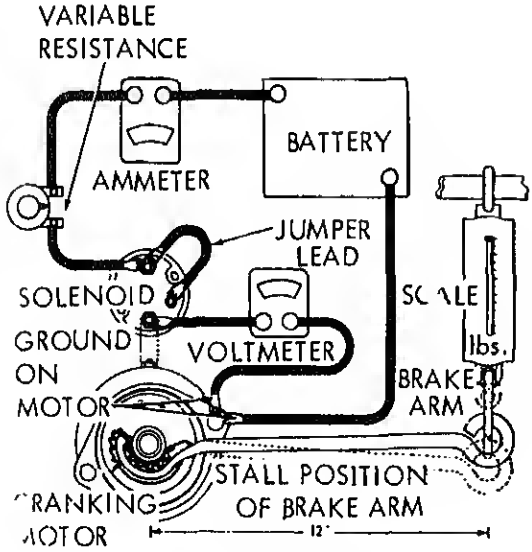
(*f*) Low no-load speed and low current draw indicate a high internal resistance due to poor connections, defective leads, dirty commutator and causes listed under (*e*).

(*g*) High free speed and high current draw indicate shorted fields.

(3) Lock-Torque Test (fig. 7-2). The lock-torque test requires the equipment illustrated. A variable resistance with a high current capacity should be used. The cranking motor should be SECURELY mounted and a brake arm hooked to the drive. When specified current is applied, the torque can be computed from the reading on the scale. A one foot brake arm will directly indicate foot-pound. If the torque is low, the motor must be disassembled for further tests and repair.

d. Disassembly

(1) Scribe marks across drive housing, fever housing, frame and end ball to facilitate reassembly in the correct relationship.



(1) The drive, armature and fi should not be cleaned in any degreasing t or with grease dissolving solvents, since t would dissolve the lubricant in the drive damage the insulation in the armature field coils. All parts except the drive sh be cleaned with oleum spirits and a br The drive can be wiped with a clean cl

(2) If the commutator is dirty it ma; cleaned with No. 00 sandpaper. NEVER U EMERY CLOTH TO CLEAN COMMU TOR.

f. Inspection and Repair

(1) Inspect housings and frames cracks and distortion. Inspect thread tapped holes for damage. Replace defec parts.

(2) Inspect sleeve bearings for wear. place bearing if defective. Check for looso in housing or end bell. Replace worn or fective bearings. If new bearing is loos bore, replace housing or end bell.

(3) Inspect wicks for tests, fraying, wear. Replace if defective.

(4) Turn down commutator if gro or out of round. Undercut mica to a d of 0.025 to 0.032 inch below surface of mutator. Do not widen slots when under ting mica.

(5) Inspect drive pinion for broker badly worn teeth. Inspect clutch splines wear and damage. Inspect shell for cra or broken condition. Check to make sure ion will drive into one direction and will in opposite direction. Replace drive clutc defective.

(6) Inspect shift lever, shaft, and s noid plunger for cracks or distortion. Rep defective parts.

(7) Inspect bellows for tears, punctu and deterioration.

of field coil, if multimeter does not read field coil is open and should be replaced.

(3) To test field coil windings for grounds, disconnect field coil winding ground connection. Connect meter probes to field frame and field connector, if multimeter reads, field coil is grounded, and must be repaired or replaced.

.h. Assembly of End Bell and Brush Holder Plate

(1) If wick was removed during disassembly, saturate a new wick and plug with oil and install in end bell. Wick must not be in fill hole.

(2) Apply sealer to expansion plug hole and install plug. Fill reservoir with oil and install pipe plug.

(3) If bushing was removed, press a new bushing in end bell and install expansion plug.

(4) Assemble brush holder plate and end bell in the reverse order of disassembly but do not install brushes.

i. Starter Assembly

(1) If wicks were removed during disassembly, install wicks and plugs following same instructions specified for end bell ((1) and (2) above.)

(2) If bushings were removed, press new bushings into housings.

(3) Assemble starter in reverse order of disassembly with the following exceptions and additions.

(4) If field windings were removed, coat threads of pole shoes screws with a suitable thread sealer before installation. Varnish inside of frame and winding assembly. Leave 0.38 inch from each end of frame free of

(6) If new brushes are being installed cover commutator with No. 00 sandpaper tem porarily install armature, brushes, and en bell and turn in brushes. Disassemble, re move sandpaper, and clean armature an brush holder plate assembly.

(7) Install thrust washer on armatur shaft and install preformed packing on en bell. Install end bell assembly with assem bled brush holder assembly on commutato and install brushes. Install flat washer on ar mature shaft and install armature and end be as a unit into frame.

j. Adjusting Drive Clutch Pinion Clearanc

(1) Remove plug.

(2) With starter pinion in engaged po sition, press clutch inward lever to take u slack.

(3) Adjust hex self-locking nut unt clearance between outer face of pinion an inner face of housing overhaul is 23/64 inc ± 1/32 inch.

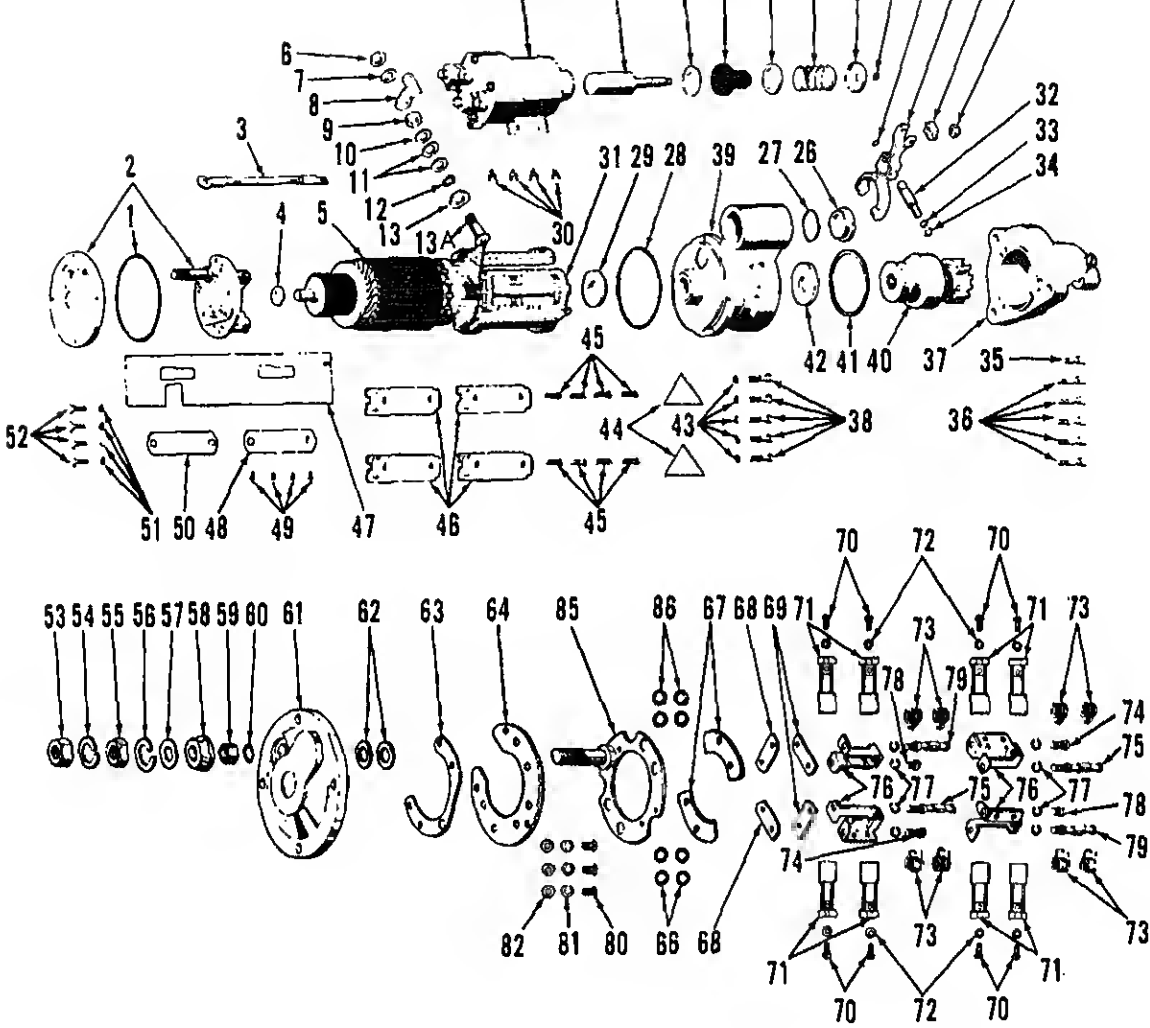
k. Installations. Refer to Operator's Manua

30. Generator-Battery Charging

a. General. The generator is a 24-volt 4 ampere type mounted on the front of the en gine. It is fungus and corrosion resistant an is arranged for "B" type circuit with th field grounded inside the generator.

b. Removal. Refer to Operator's Manual.

c. Bench Testing. To check the generato for electrical output, Connect an ammeter i series with a battery to the generator outpu terminal. Also connect a voltmeter from th generator output terminal to ground, and load rheostat across the battery. Connect



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1 O-ring
2 Plate assembly
3 Terminal and lead
4 Washer
5 Armature
6 Nut
7 Lockwasher
8 Connector
13 Bushing
13A Stud
14 Switch
15 Plunger assembly
16 Washer
17 Boot
18 Retainer
19 Spring
24 Guide
25 Nut
26 Plug
27 O-ring
28 O-ring
29 Washer
30 Screw and washer
31 Field coil
36 Screw
37 Housing
38 Screw
39 Housing
40 Drive clutch assembl
41 Gasket
42 Washer
43 Lockwasher

51	Washer	60	O-ring	69	Plate	78	Screw
52	Screw	61	Frame	70	Screw	79	Holder screw
53	Nut	62	Washer	71	Brush	80	Screw
54	Lockwasher	63	Plate	72	Lockwasher	81	Lockwasher
55	Nut	64	Plate	73	Spring	82	Washer
56	Lockwasher	65	Plate and stub	74	Screw		

Figure 7-3—Continued.

d. Disassembly. Refer to figure 8–2 and disassemble the generator.

c. Cleaning

(1) Clean the armature and field windings of any dirt or magnetized particles. To remove grease and oil, apply a light coat of a safety type petroleum solvent such as MIL–T–6003, with a brush. Wipe clean, then use compressed air to remove any remaining dirt film. Do not use any degreasing compounds or submerge the armature in a degreasing tank as this would damage the insulation.

(2) Clean the commutator with 00 sandpaper and remove sand particles with compressed air.

(3) Clean the commutator end frame, and components with an approved solvent and dry thoroughly.

Caution: **Do not soak insulators.**

f. Inspection and Repair

(1) Inspect the commutator for roughness, high mica, loose winding, burrs, or pits. Smooth the commutator with 00 sandpaper or undercut on a lathe. Replace the armature if the commutator bars are less than 1/16-inch thick after undercut. Undercut the mica between the bars to a depth of 1/32-inch.

Caution. **Do not widen commutator slots by removing metal from bars when undercutting. Use only solder with a rosin core flux.**

(2) Inspect the armature shaft for wear,

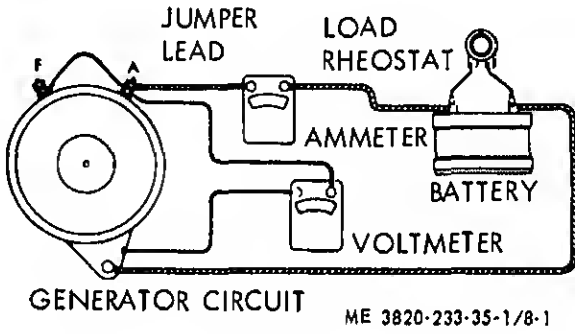


Figure 8–1. Connections for checking output on "B" circuit generators.

(5) Inspect brush plate for cracks an loose rivets. Inspect insulated brush holde for grounds.

(6) Inspect brush springs for tensic and signs of breaks or other damage. Repla brushes.

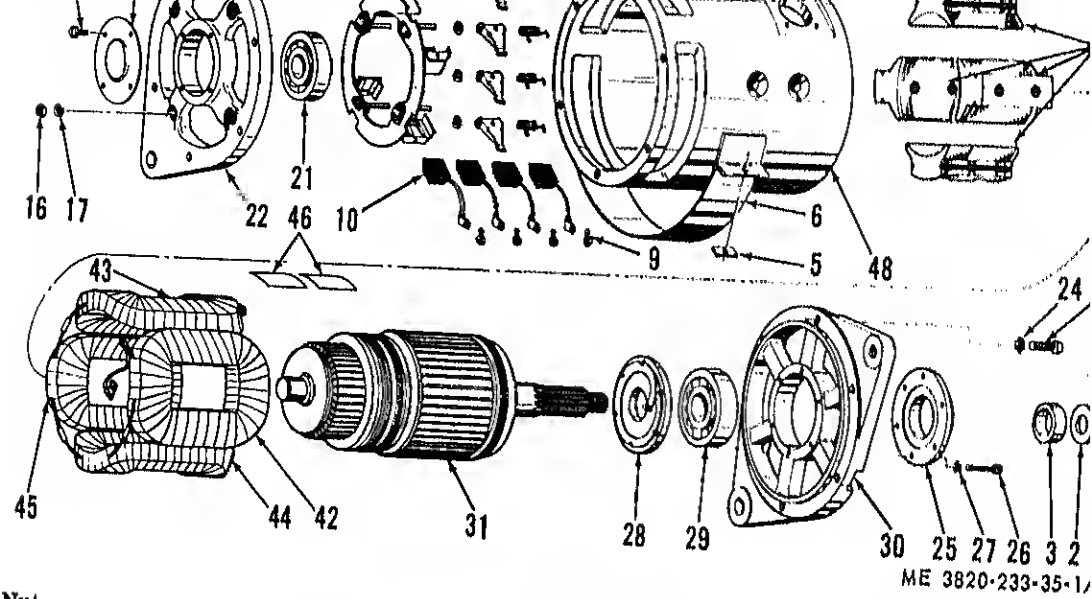
(7) Inspect the ball bearings for smoot operation. Inspect for excessive side play ar damaged surfaces.

(8) Inspect the generator field frame fc breaks, cracks, and damaged threads.

(9) Inspect all hardware for damage threads.

b. Testing

(1) Inspect for windings grounded core with a continuity tester. Touch one prol of the tester to the armature shaft and tl other to each commutator riser. An indicatic



1 Nut
2 Washer
3 Collar
4 Screw
5 Nut
6 Cover
7 Screw
8 Lockwasher
9 Screw and washer
10 Brush
11 Lead assembly
12 Spring
13 Arm
14 Washer
15 Plate assembly
16 Nut
17 Lockwasher
18 Screw
19 Screw
20 Plate
21 Bearing
22 Frame
23 Screw
24 Lockwasher
25 Plate
26 Screw
27 Lockwasher
28 Plate
29 Bearing
30 Frame
31 Armature
32 Screw
33 Screw and washer
34 Lead and clip
35 Lead and clip
36 Terminal
37 Elbow
38 Screw and wash
39 Spacer
40 Pole shoe
41 Screw
42 Coil
43 Coil
44 Coil
45 Coil
46 Insulator
47 Pin
48 Housing

Figure 3–2. Battery charging generator, exploded view.

(3) Inspect for shorts with a growler and steel strip. The steel strip will vibrate against the armature over a shorted area as the armature is turned.

(4) Inspect the field windings for worn or frayed insulation, defective connections, opens, and field current draw.

(5) Replace or repair all defective parts as necessary.

h. Assembly. Reassemble generator in direct reversal of disassembly ** illustr

or sandpaper wrapped around commu Clean commutator thoroughly and cor assembly.

g. Installation. Refer to Operator's ma

31. Generator Regulator

a. General. The generator regulator 9–1) is a watertight, fungus and corr resistant unit for milita

egulator are made by means of mating Ordance-type receptacles on the vehicle wiring arness.

b. Removal. Refer to Operator's Manual.

c. Regulator Maintenance

(1) Test specifications for regulator odel 111 8858 are as follows:

OLTAGE REGULATOR	
Air Gap (inches).....	.084
Satisfactory Operating Range (volts).	13.9–14.9*
If outside range, adjust to (volts).	14.3*
URRENT REGULATOR	
Air Gap (inches).....	.115
Satisfactory Operating Range (amp.).	38–42
If outside range, adjust to (amp.).	.40*
UTOUT RELAY	
Air Gap (inches).....	.048
Point Openings (inches).	.035
Satisfactory Closing Range (volts).	11.8–13.4*
If outside range, adjust to (volts).	12.8*
ESISTOR VALUES (OHMS)	
A.....	40 (2)
B.....	375 (2)
C.....	100 (1)
D.....	100 (2)
E.....	20 (1)

THESE VALUES APPLY ONLY WHEN HE REGULATOR IS BEING TESTED AT PERATING TEMPERATURE, ON THE EHICLE, AND IN ACCORDANCE WITH HE PROCEDURE DESCRIBED IN THE OLLOWING SECTION.

(2) Mechanical checks and adjustments air gaps, point openings) must be made ith the battery disconnected and the regu-

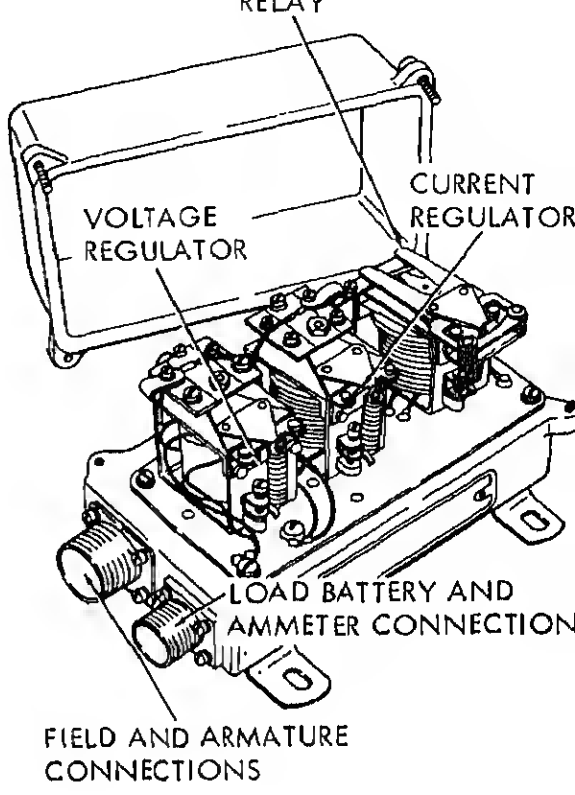


Figure 9-1. Generator regulator with cover remov

remembered that tungsten is extremely ha and platinum is relatively soft. Platinu points should be filed very lightly to av excessive loss of metal. Never use sandpap or emery cloth to clean contact points.

e. Regulator Checks and Adjustments (f 9–2)

(1) Cutout Relay. Three checks and a justments are required on the cutout rel air gap, point opening and closing volta Air gap and point opening are checked w the battery disconnected.

(*a*) Air Gap—Measure the air gap

point opening and adjust by bending the upper armature stop.

(c) Closing Voltage—To check the closing voltage on the cutout relay, insert Special Testing Harness No. 1 (fig 9–4) in the generator circuit, and connect a voltmeter between T–1 (armature) and the ground screw at the end of the regulator (fig. 9–5). Gradually increase generator speed and note the voltage at which the relay contact points close. Adjust the closing voltage, if necessary, by turning the adjusting screw at the base of the cutout relay frame. Increasing the spiral spring tension increases the relay

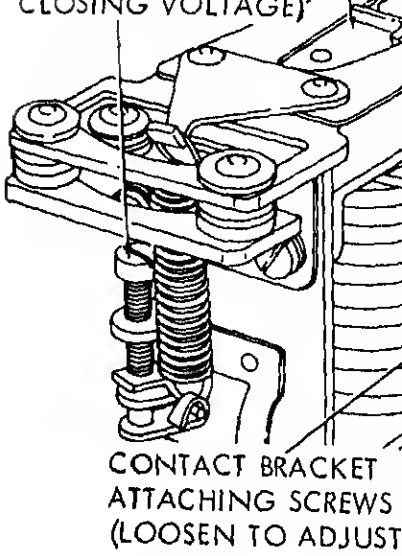


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Figure 9–3. Cutout relay adjust

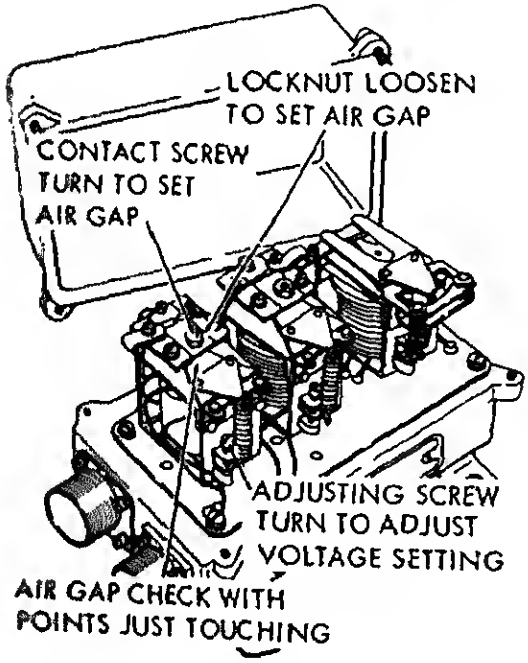

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Figure 9–2. Voltage and current regulator adjustments

closing voltage—decreasing the s
tension lowers the closing voltag

(2) Voltage Regulator. Two
adjustments are required on the
lator: air gap and voltage settin
is called to fact that the AIR G
the POINT OPENING is check
justed.

(c) Air Gap—The air ga
measured between the armature a
of the core (not the residual pin
next to the residual pin, with the
touching. The proper way to meas
gap is to push the armature dow
points open, release until the p
close, then measure the air ga
measure the gap with the flat spri
ports the contact screw raised up
mounting plate. To adjust, loosen

ouch.

(*b*) Voltage Setting—(fig. 9–6). Disonnect battery cable from regulator, and conect voltmeter between regulator battery terinal, and ground screws in the end of the egulator. With the generator operating at approximately 3000 RPM and the regulator at operating temperature, note the voltage setng. Adjust by turning the adjusting screw t the base of the unit, thereby changing the piral spring tension. Increasing the spring

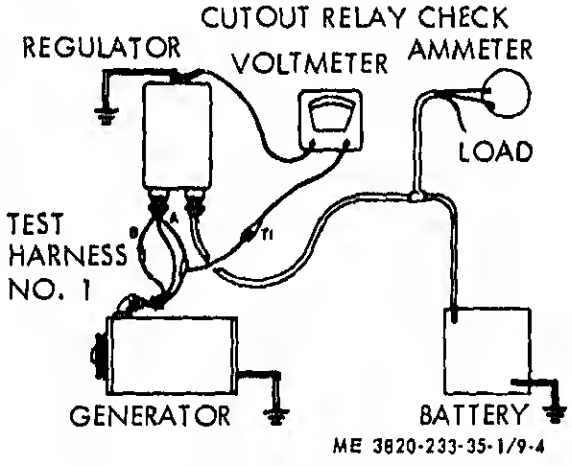
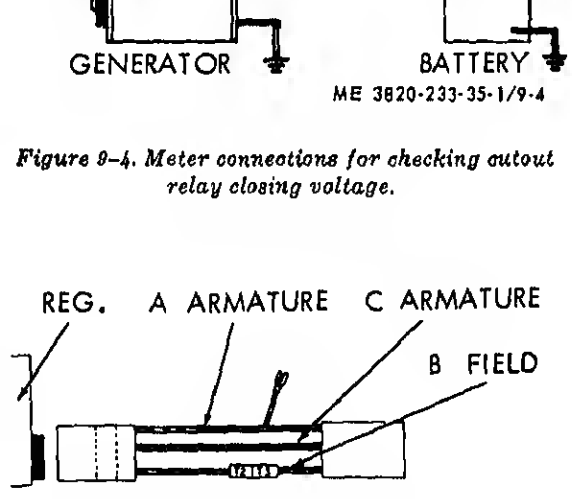


Figure 9–4. Meter connections for checking cutout relay closing voltage.



(3) Current Regulator. Two checks a adjustments are required on the current reg lator: air gap and current setting. The A GAP and not the POINT OPENING checked and adjusted—procedure being t same as for the voltage regulator above. Cu rent Setting (fig. 9–7). To check the curre regulator setting, it is necessary to keep t voltage regulator from operating so that t generator output can increase to the value f which the current regulator is adjusted, a thus cause the current regulator to opera Three methods of preventing voltage reg lator operation are available. Regardless of t method used, disconnect battery cable fr the regulator and connect an accurate a meter in series between these junctions. Th meter will measure the current regulat setting. The three methods of preventi voltage regulator operation are:

(*a*) Battery Discharge Method—I this method, the battery is partly discharg by cranking the engine for 30 seconds wi lights, and other accessories turned NEVER USE THE CRANKING MOTO FOR MORE THAN 30 SECONDS AT TIME WITHOUT PAUSING TO ALLO THE CRANKING MOTOR TO COOL OF Excessive cranking will damage the cranki motor. Immediately after the cranking cyc start the engine and allow the generator ou put to increase to its maximum as determin by the current regulator setting before risi battery voltage causes the voltage regulat to operate. Since battery voltage recove very quickly, this method requires prom action.

(*b*) Load Method—If a load appro mating the current regulator setting is plac across the battery during the time that t

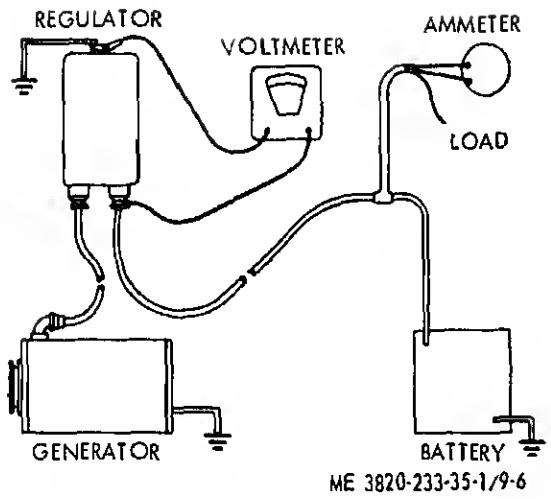


Figure 9–6. Meter connections for voltage regulator checks.

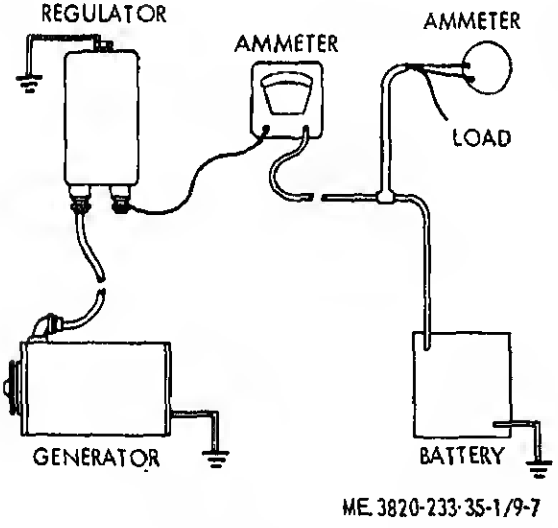


Figure 9–7. Meter connections for current regulator checks.

rent regulator setting, turn the adjust screw at the base of the unit thereby chang the spiral spring tension. Increasing the t sion will increase the current setting. Af each change of adjustment, reduce genera speed until cutout relay opens, then return speed and read current. (Higher resid magnetism resulting from uncontrolled v age during this test will cause the voltage regulate at an abnormally low voltage af the jumper is removed. To restore proper eration, the generator must be "cycled", tl is, stopped and restarted. Do not attemp check voltage regulator after using JUMPI LEAD METHOD until this condition h been corrected.)

f. Installation. Refer to Operator's Manu

32. Radiator Assembly

a. General. The radiator assembly mounted on the front of the engine. As t water flows through the radiator core, it cooled by air forced through the core by belt driven fan. A guard is attached to t fan shroud to prevent loose clothing, hant and other objects from becoming entangl in the fan blades.

b. Removal and Disassembly

(1) Remove the power unit (para 24)
(2) Drain the radiator.
(3) Remove the hoods, side panels, a tie rods (Operator's Manual).
(4) Remove and disassemble the radiat assembly in the numerical sequen as illustrated on figure 10.

c. Cleaning, Inspection, and Repair

(1) Flush the inside of the radiator wi an approved cleaning solvent.

(2) Plug the radiator openings. Inse

d. Reassembly and Installation

(1) Refer to figure 10 and assemble and stall the radiator assembly.

(2) Install the hoods, side panels, and e rods (Operator's Manual).

(3) Fill the radiator with coolant.

(4) Install the power unit (para 24).

. Water Pump

a. General. The water pump is mounted on e front end of the blower and is driven by e lower blower rotor shaft. The centrifugal pe water pump circulates coolant through e cylinder block, cylinder head, radiator, nd oil cooler.

b. Removal. Refer to Operator's Manual.

c. Disassembly. Disassemble the water pump in the numerical sequence as illustrated on figure 11.

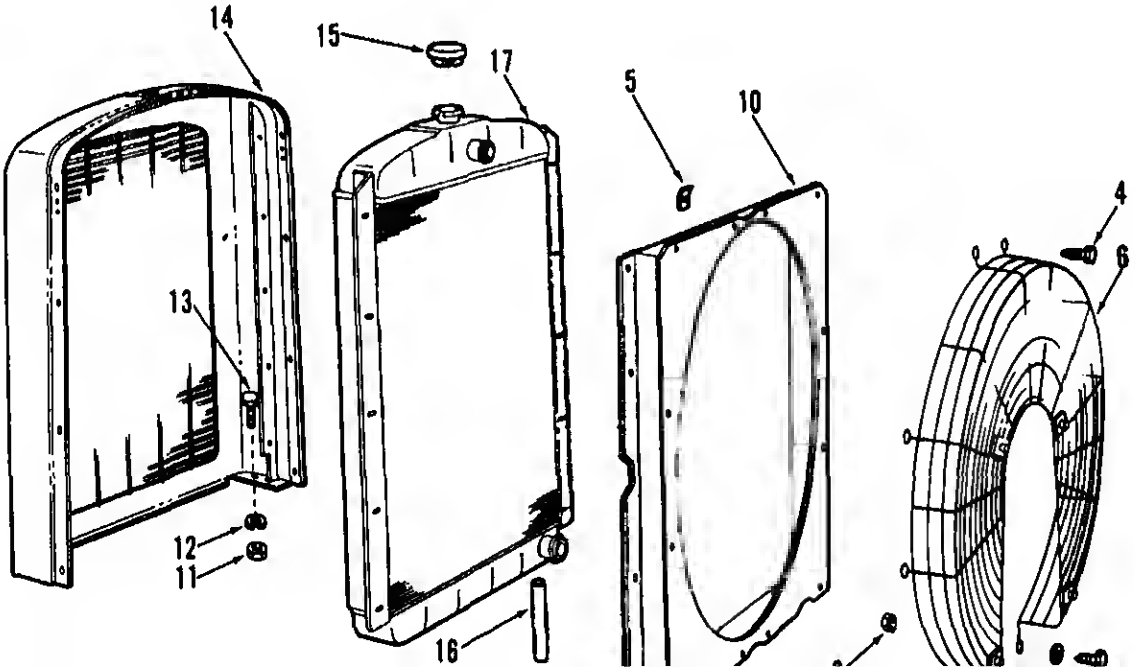
Note. It may be necessary to use an arbor press to separate water pump shaft from impeller.

d. Cleaning, Inspection, and Repair

(1) Clean all parts with an approved cleaning solvent.

***Caution.* Do not immerse pump shaft assembly in cleaning solvent. Dirt may be washed into sealed shaft bearing and cannot be entirely removed.**

(2) Inspect pump body, pump shaft, seals and impeller for cracks scoring wear, or



pounds.

e. Reassembly. Reassemble the water pump in the reverse numerical sequence as illustrated on figure 11.

(1) If steel insert is replaced, be sure the counterbore in pump body is thoroughly cleaned before installing new insert. Press insert in until it contacts the shoulder in pump body.

Note. Do not mar the seal contact surface of the insert when pressing it into the pump body.

(2) Install slinger on the pump shaft assembly with the flange of the slinger approximately 3/16 inch from end of the outer race of the shaft assembly bearing.

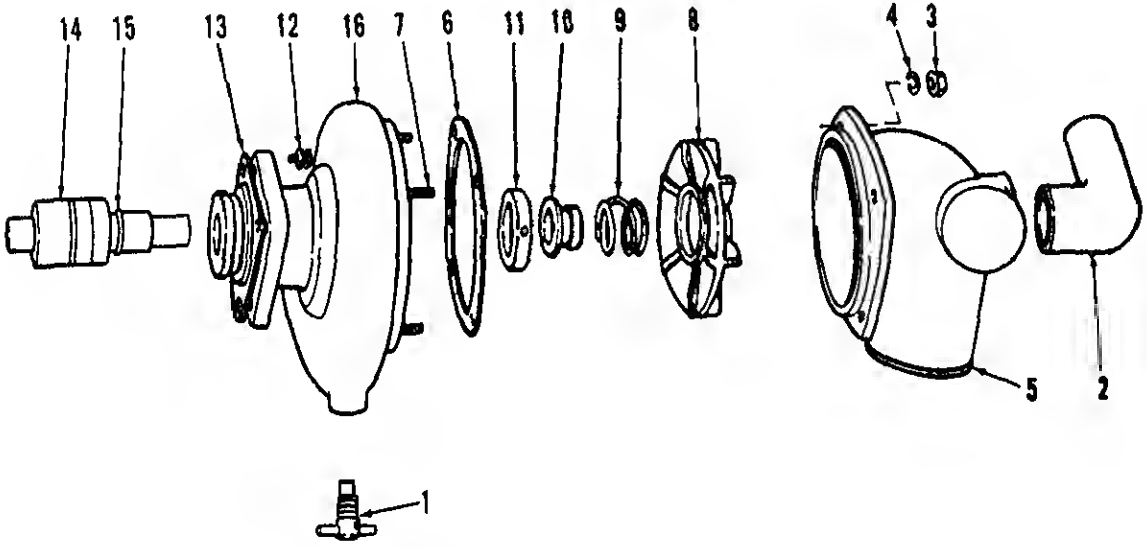
bearing touches the shoulder in the pump body.

(4) Clean surface of pump seal, and apply a thin coat of liquid soap on inside surface of seal. Slide seal onto pump shaft until it is seated firmly against the pump body insert.

(5) Install pump seal spring with the small end toward the seal.

(6) Support bearing end of pump shaft on an arbor press and press impeller onto the shaft. Press until face of impeller hub is flush with the end of the pump shaft.

(7) Rotate pump shaft by hand to be sure impeller does not contact pump body.



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1 Draincock
7 Stud
13 Gasket

e pump cover over studs and secure to mp body with four lockwashers and nuts.

(9) Install drain cock.

f. Installation. Refer to Operator's Man-

Hydraulic Governor and Governor Drive

a. Generat

(1) Thy hydraulic governor regulates e engine speed under varying load condi-ns, and serves as an automatic shutdown vice when there is a malfunction in the bricating oil pressure system. Should the gine fail to supply oil to the governor, the rvo motor piston will drop, allowing the el rod to return to the NO FUEL position.

(2) The governor is driven by the upper wer rotor through a horizontal drive shaft d bevel gear, and a vertical driven shaft d bevel gear. Both are mounted on ball arings and located in the governor drive using.

b. Removal. Refer to Operator's Manual.

c. Disassembly. Disassemble the governor d governor drive assembly in the numerical quence as illustrated on figure 12.

d. Cleaning, Inspection, and Repair

(1) Wash all parts with an approved eaning solvent and dry thoroughly.

(2) Inspect pilot valve plunger for ratches or burrs. Defective areas may be rrected with a fine India stone.

Note. Do not round off edges of plunger when essing it with the India stone.

(3) Inspect servo motor piston for ratches or burrs. Correct defective areas ith a fine India stone.

Note. Do not round off edges of piston when essing it with the India stone.

(1) Reassemble the governor and g ernor assembly in the reverse of the num cal sequence as illustrated on figure 12.

(2) When reassembling bearing (and drive shaft (16), support bearing on bed of an arbor press, and press drive sh into bearing until shoulder of shaft is aga the bearing.

(3) To reassemble bearing (77), sle (76), and driven shaft (78), start bearing shaft followed by the sleeve. Properly s port sleeve on the bed of an arbor press, press shaft into bearing and sleeve.

f. Installation and Adjustment. Refer the Operator's Manual.

35. Fuel Pump

a. General. The fuel pump is mounted the rear of the blower assembly and is dri by the lower blower rotor. The fuel pu draws fuel from the supply tank and livers it at correct pressure to the fuel jectors.

b. Removal

c. Disassembly. Disassemble the fuel pu in the numerical sequence as illustrated figure 13.

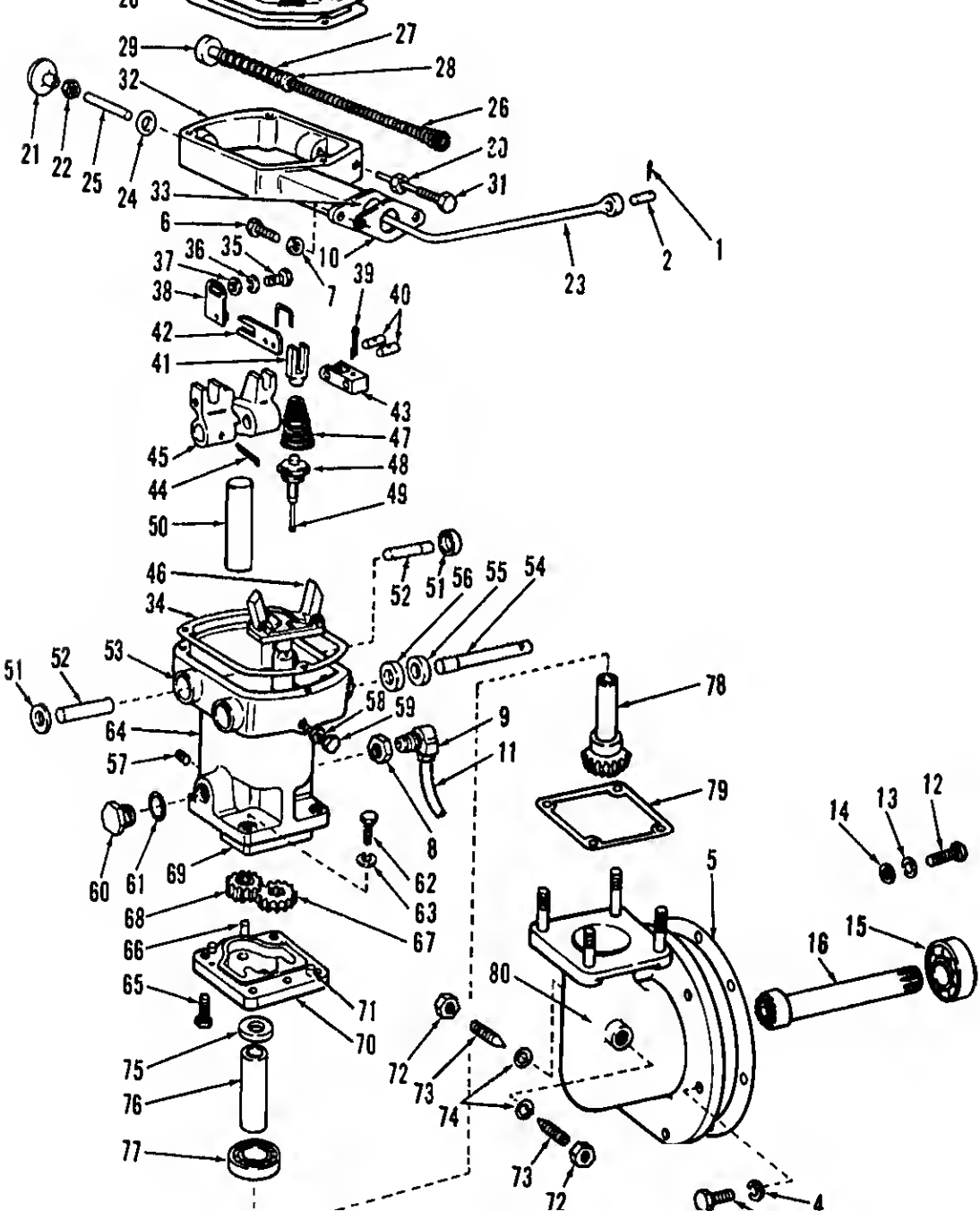
Note. Use extreme care when removing shaft as score marks on the square end of shaft damage the oil ssal contact surface.

d. Cleaning, Inspection, and Repair

(1) Clean all of the parts with an proved cleaning solvent and dry th thoroughly.

(2) Inspect oil seals for nicks cracks. If oil seals are removed, they mus discarded and replaced with new seals.

(3) Inspect pump shafts and gears wear or scoring. The driven shaft is serv as a gear and shaft assembly only. Rep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5	Gasket	25	Spacer	45	Lever	65	Bolt
6	Bolt	26	Spring	46	Ball head assembly	66	Stud
7	Lockwasher	27	Spring	47	Spring	67	Gear
8	Nut	28	Disc	48	Bearing	68	Gear
9	Elbow	29	Collar	49	Plunger	69	Ring
10	Gasket	30	Nut	50	Piston	70	Base
11	Tube	31	Screw	51	Plug	71	Pin
12	Bolt	32	Sub cap	52	Shaft	72	Nut
13	Lockwasher	33	Plug	53	Bushing	73	Setscrew
14	Washer	34	Gasket	54	Shaft	74	Gasket
15	Bearing	35	Bolt	55	Seal	75	Ring
16	Shaft	36	Lockwasher	56	Seal	76	Sleeve
17	Screw	37	Washer	57	Plug	77	Bearing
18	Washer	38	Bracket	58	Nut	78	Shaft
19	Cover	39	Pin	59	Screw	79	Gasket
20	Gasket	40	Pin	60	Plug	80	Housing

Figure 12—Continued.

(6) Inspect drive coupling fork for wear or other damage. Replace defective coupling.

(7) Test valve retaining spring. Apply a load of 7.1 pounds to 7.5 pounds to the spring. The spring should compress to a length of 1.18 inch. If the spring fails to meet this specification, replace the valve retaining spring.

e. Reassembly. Reassemble the fuel pump in the reverse of the numerical sequence as illustrated on figure 13.

Note. Install fuel pump drive gear over the end of the drive shaft which is not squared to prevent scoring the square end of the shaft.

Note. Apply only a thin coat of approved sealant on the face of the pump cover outside of the gear pocket area. Too much sealant could increase the clearances and affect pump efficiency. Do not apply sealant into the gear pocket, or damage to the gears and shafts will result.

f. Installation. Refer to the Operator's Manual.

36. Blower and Blower Drive Assembly

b. Removal

(1) Drain the cooling system (Operator's Manual).

(2) Remove the oil lines (Operator Manual).

(3) Remove the fuel filter lines (Operator's Manual).

(4) Remove the fuel pump (Operator Manual).

(5) Remove the water pump (operator Manual).

(6) Remove the hydraulic governor (Operator's Manual).

(7) Remove the air inlet housing blower, and blower drive assembly in the numerical sequence as illustrated on figure 14–1.

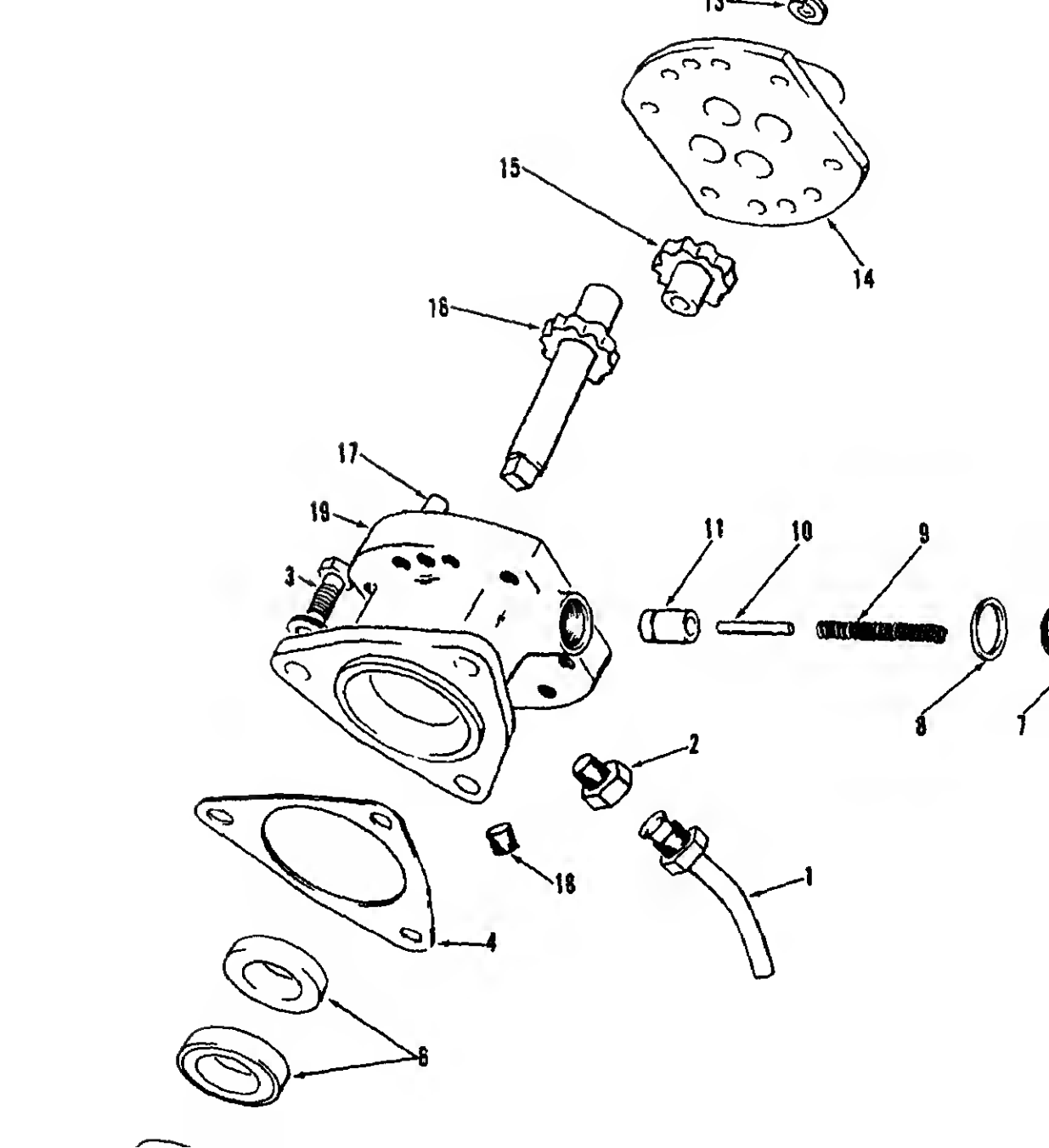
c. Disassembly

(1) Disassemble the air inlet housing in the numerical sequence as illustrated on figure 14–2.

(2) Disassemble the blower and blower drive assembly in the numerical sequence as illustrated on figures 14–3 and 14–4.

d. Cleaning, Inspection, and Repair

(1) Clean all of the blower parts with an approved cleaning solvent and dry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4	Gasket	9	Spring	14	Cover	19	Body
5	Fork	10	Pin	15	Shaft assembly		

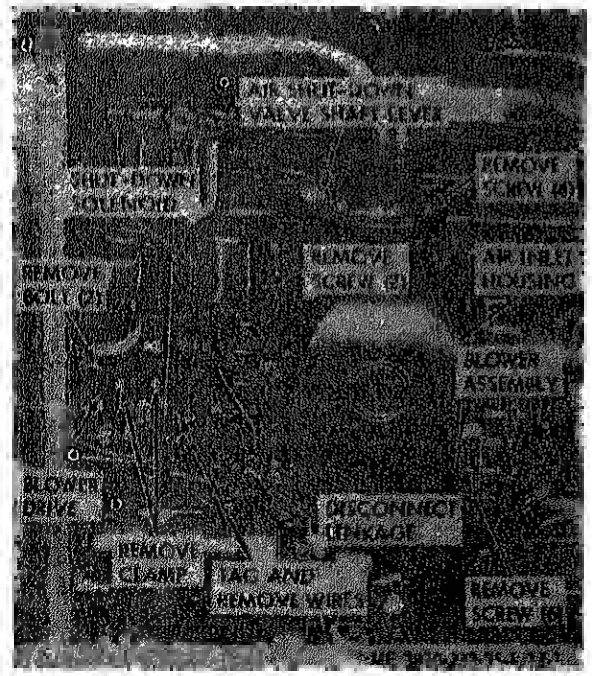
Figure 13—Continued.

cloth. Replace excessively scored or burred rotors.

(4) Inspect rotor shaft serrations for wear, burrs, or peening. Replace defective rotor.

(5) Inspect the inside surfaces of the blower housing for burrs or scoring. Clean up slightly scored or burred areas with emery cloth.

(6) Inspect inside face of each end plate. If the finished face is slightly scored or burred, clean with emery cloth.



STEP 1. REMOVE SHUT-DOWN SOLENOID.
STEP 2. DISCONNECT SHUT-DOWN WIRE

(7) Inspect the serrations in the blower timing gears for wear and peening. Inspect gear teeth for wear, chipping, or other damage. Backlash between gear teeth should not exceed 0.004 inch. Replace defective or damaged timing gears as a set.

(8) Inspect blower drive shaft serrations for wear or other damage. Replace a damaged or bent shaft.

(9) Inspect the serrations inside the rotor drive hub for wear or other damage. Replace a defective drive hub.

(10) Inspect the blower drive coupling springs and cam for wear and other damage. Replace defective parts.

(11) Inspect the thrust washers. Replace worn or scored washers.

(12) Inspect bearings for binding, wear or scoring. Replace a defective bearing.

(13) Inspect the blower drive coupling support, cam, spring seats, and spring packs for wear or other damage. Replace any defective parts.

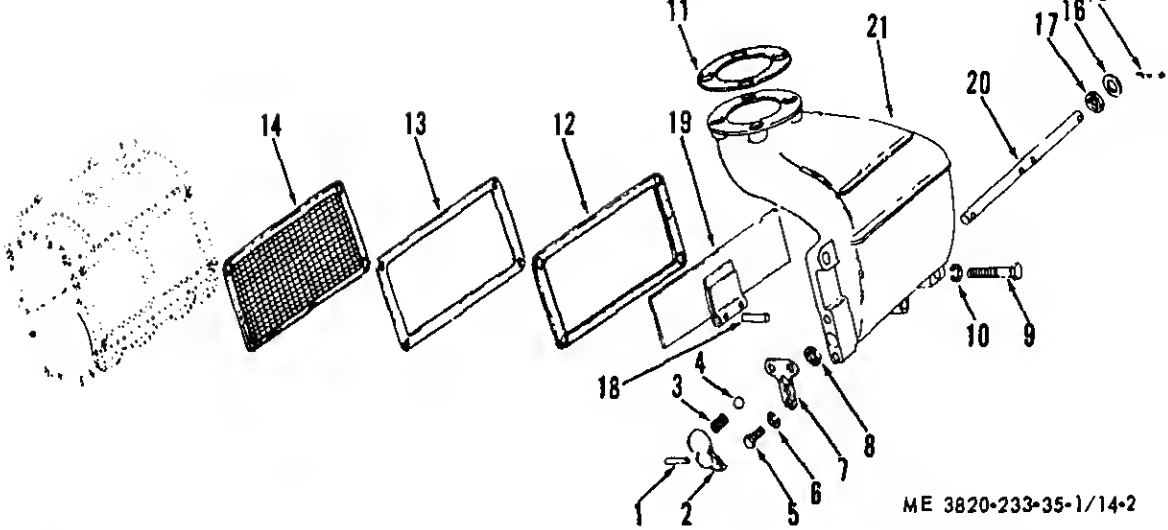
(14) Inspect blower drive gear teeth for chipping, wear, or scoring. Replace a defective gear.

(15) Replace worn or excessively damaged air inlet housing, blower, and blower drive parts.

c. Reassembly

(1) Reassemble the blower assembly in the reverse of the numerical sequence as illustrated on figure 14–4.

(*a*) Press oil seal (44) into the end plate (37). Position the oil seal approximately .005 inch below the finished face of



1	Pin	7	Lockplate	13	Plate	19	Valve
2	Lever	8	Ring	14	Screen	20	Shaft
3	Spring	9	Bolt	15	Pin	21	Housing
4	Ball	10	Lockwasher	16	Washer		
5	Bolt	11	Gasket	17	Seal		
6	Lockwasher	12	Gasket	18	Pin		

Figure 14–2. Air inlet housing, exploded view.

(*c*) Torque bearing retainer bolts (26 and 41) to 7–9 foot-pound.

(*d*) Torque water pump drive coupling retaining bolt (39) to 18 foot-pound.

(*e*) Torque end plate cover (37) mounting bolts (35) to 13–17 foot-pound.

(*f*) Before installing the blower rotor timing gears (24) check rotor-to-end plate and rotor-to-housing clearances. See figure 14–5.

(*g*) Torque rotor timing gear retaining bolts (20) to 55–65 foot-pound.

(*h*) After the blower rotors (33 and 34) and timing gears (24) are installed, time the blower rotors as shown on figure 14–5.

Note. When the right hand helix gear is moved out, the right hand helix rotor will turn counter-clockwise. When the left hand helix gear is moved out, the left hand helix rotor will turn clockwise.

Note. Installing a .003 inch shim in back of a rotor gear will turn the rotor .001 inch.

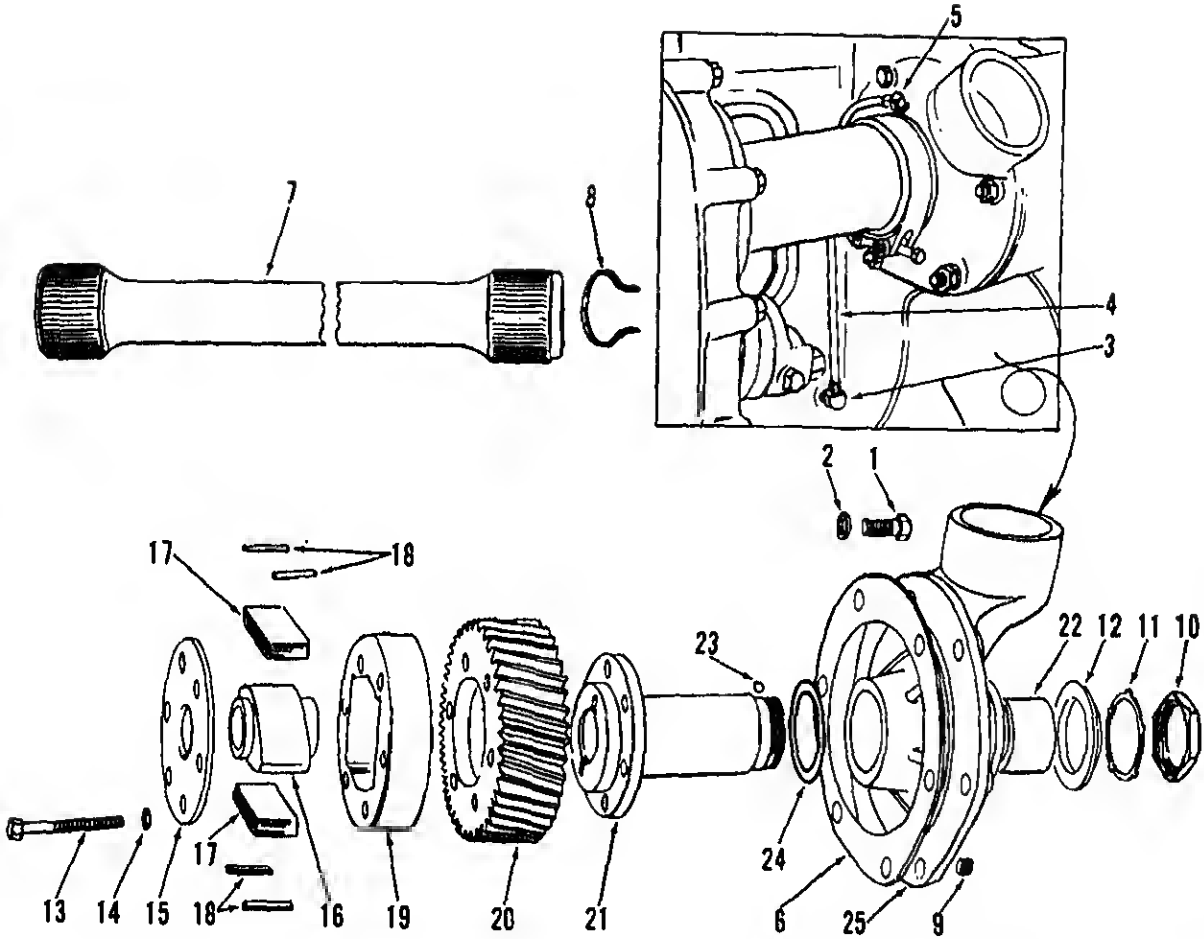
(*j*) Determine the minimum clearances at points "A" and "B" shown on figure 14–5. Measure clearances at the ends of each lobe, making 12 measurements in all.

(*k*) Refer to figure 14–5 and measure the clearance between each rotor lobe and the blower housing at both the inlet and outlet side. Twelve measurements are required.

(*l*) Torque the plate to hub bolts (14) to 25–30 foot-pound.

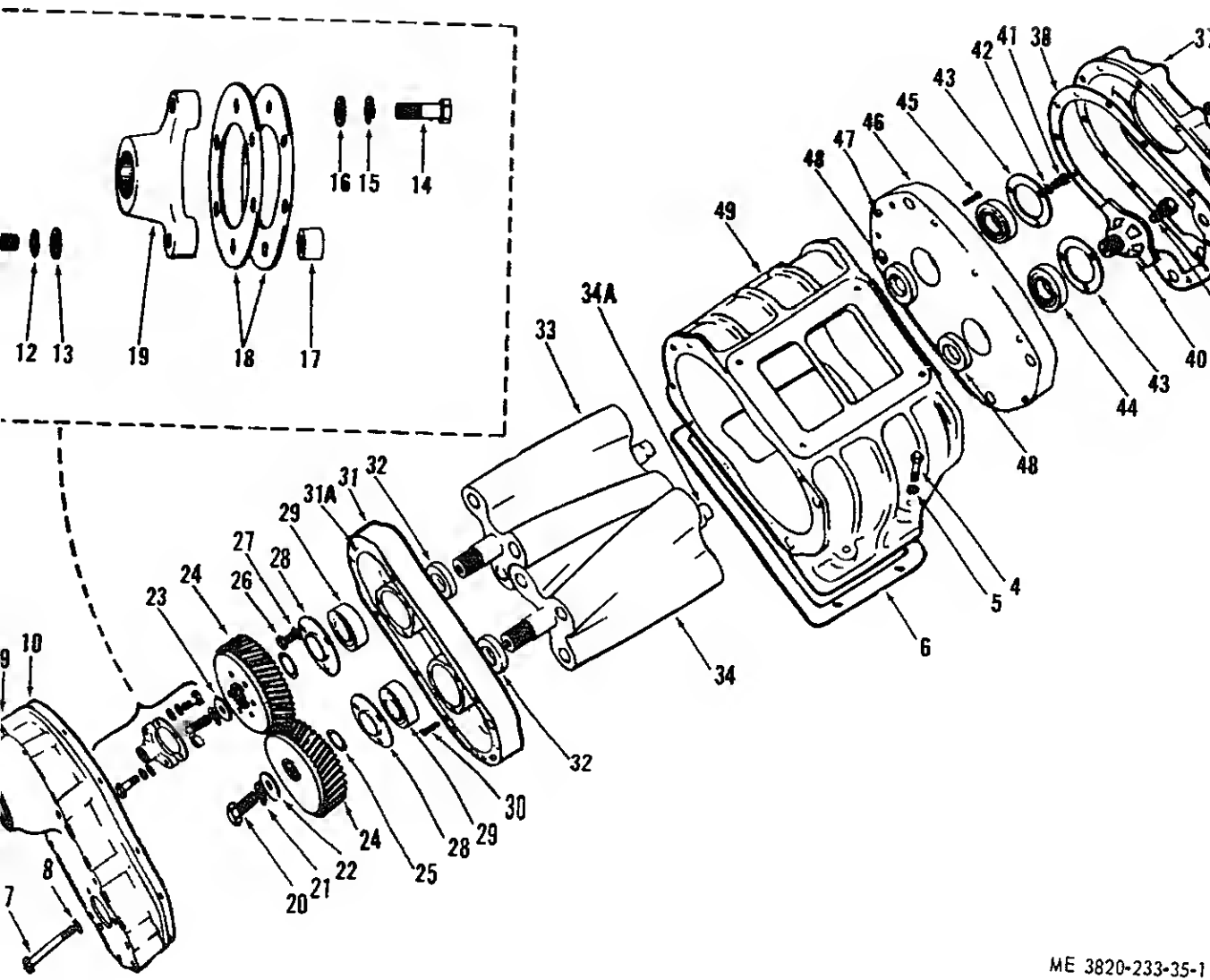
(*m*) Torque plate to gear bolts (11) to 25–30 foot-pounds.

(*n*) Measure the runout of the rotor drive hub splines with an indicator. The spline runout must not exceed .020 inch total



1	Bolt	8	Ring	15	Retainer	22	Bearing
2	Lockwasher	9	Plug	16	Cam	23	Ball
3	Tee	10	Nut	17	Spring	24	Washer
4	Pipe	11	Lockwasher	18	Seat	25	Support
5	Elbow	12	Washer	19	Support		
6	Gasket	13	Bolt	20	Gear		
7	Shaft	14	Lockwasher	21	Hub		

Figure 14-3. Blower drive, exploded view.



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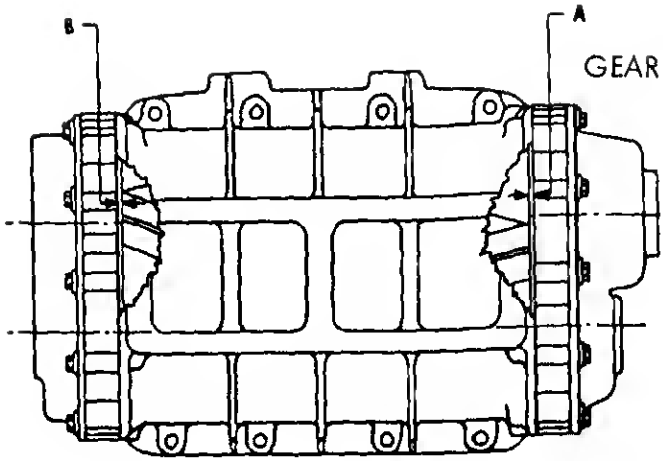
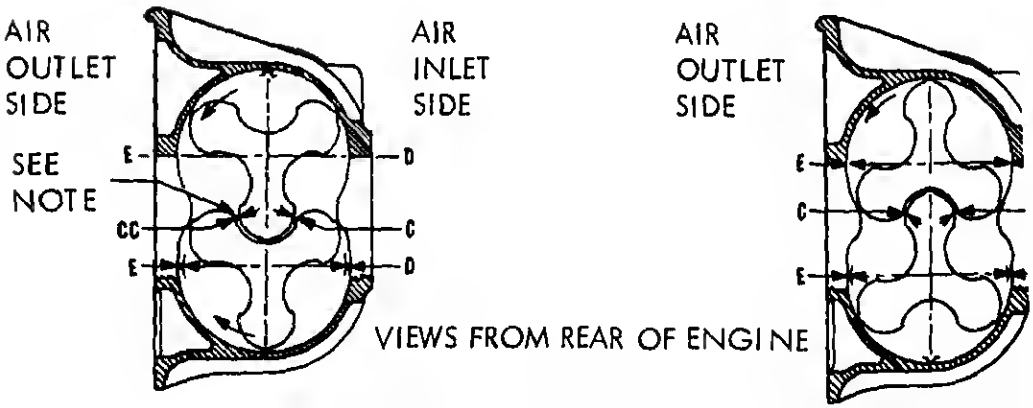
15 Lockwasher
16 Washer
17 Spacer
18 Plate
19 Hub
20 Bolt
21 Lockwasher
22 Disc
23 Disc
24 Gear set
25 Shim
26 Bolt
28 Retainer
29 Bearing
30 Screw
31 Plate
31A Pin
32 Seal
33 Rotor
34 Rotor
34A Shaft
35 Bolt
36 Lockwasher
37 Cover
39 Bolt
40 Coupling
41 Bolt
42 Lockwasher
43 Retainer
44 Bearing
45 Screw
46 Plate
47 Pin
48 Seal
49 Housing

Figure 14-4—Continued.



	A	B	C	CC	D	E
MIN.	.007	.009	.014	.002	.015	.004
MAX.				.006		

TIME ROTORS TO DIMENSIONS ABOVE



VIEWS FROM REAR OF ENGINE